AUGUST 1992

FINAL
ENVIRONMENTAL IMPACT STATEMENT

DEACTIVATION OF THE MINUTEMAN II MISSILE WING AT WHITEMAN AIR FORCE BASE, MISSOURI

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, AIR COMBAT COMMAND
LANGLEY AFB, VA

COVER SHEET

a. Responsible Agency: U.S. Air Force

b. Action: The Air Force proposes to deactivate the Minuteman II (MM II) intercontinental ballistic missile (ICBM) system of the 351st Missile Wing (MW) based at Whiteman Air Force Base (AFB) in Johnson County, Missouri, over a period of approximately 3 years beginning in October 1992. The deactivation is necessary to remove the oldest system from the ICBM force while maintaining credible nuclear deterrence at the least cost and to meet expectations of the Strategic Arms Reduction Treaty (START). The October 1992 start date could be delayed nearly 1 year because it is dependent on START ratification. The proposed action, full deactivation, would affect 150 launch facilities (LFs) and 15 launch control facilities (LCFs) within a deployment area of approximately 5,300 square miles in 14 counties, including Johnson County. The proposed deactivation procedure for each LF would entail removing the missile, certain specialized equipment, and hazardous materials from the LF and launch support building. Once removed, the missile components would be transported to Whiteman AFB and then distributed to the Federal facilities that fabricate, refurbish, store, and dispose of the components. The headworks of each launch tube would then be demolished and the support building destroyed. Each LF site would be filled in and leveled. The command and control capabilities of the LCFs would be similarly deactivated, except for the use of demolition activities. Alternatives to the proposed deactivation include: no action (continued operation of the system), missile removal and system shutdown, partial deactivation, and various implementation alternatives.

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d. Designation: final environmental impact statement (FEIS)

e. Abstract: This document assesses the potential environmental impacts of the proposed action and alternatives pertaining to the 351 MW at Whiteman AFB. The cumulative impacts of the proposed action and alternatives in conjunction with the transfer of the 442nd Fighter Wing from Richards-Gebaur AFB, Missouri, and the basing of the 509th Bomb Wing at Whiteman AFB were also assessed. Potential environmental impacts to the following resource categories were considered in this FEIS: air quality; geological resources; water resources; biological resources; cultural, archaeological, and paleontological resources; health and safety; hazardous materials/waste and solid waste; noise; transportation; and socioeconomics. Possible mitigation measures are presented to rehabilitate or restore the affected environment, or to lessen a significant impact.

EXECUTIVE SUMMARY

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The Air Force proposes to deactivate the Minuteman II (MM II) missile system to enable the Department of Defense (DoD) to maintain strategic deterrence at the least cost and to meet expectations of the Strategic Arms Reduction Treaty (START). Whiteman Air Force Base (AFB), Missouri; Malmstrom AFB, Montana; and Ellsworth AFB, South Dakota host MM II systems. This environmental impact statement (EIS), prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA, and Air Force Regulation 19-2, evaluates the potential environmental impacts of the proposed deactivation of the 351st Missile Wing (MW) at Whiteman AFB scheduled to begin in October 1992. If START is not ratified, the October 1992 start date could be delayed nearly 1 year. The Air Force is currently deactivating the MM II missile system and converting to an MM III missile system at Malmstrom AFB and deactivating the MM II system at Ellsworth AFB. An environmental assessment was prepared for the action at Malmstrom AFB (USAF, 1991e), and an EIS was prepared for the deactivation at Ellsworth AFB (USAF, 1991f).

Although START has been signed, the requirements of the Treaty are enforceable only after it has been ratified. To meet the limits on launchers required by the Treaty, a certain number of launchers, including Intercontinental Ballistic Missile (ICBM) launch facilities, must be destroyed. The Air Force intends to follow START guidelines for deactivation and dismantlement of ICBM launch facilities (LFs).

Whiteman AFB, the missile support base (MSB) for the 351 MW, is located in Johnson County in west central Missouri, 2 miles south of the town of Knob Noster, 9 miles east of the city of Warrensburg, and 65 miles southeast of Kansas City. Whiteman AFB encompasses approximately 3,700 acres of Air Force and leased land. The southern and eastern areas of the base are bordered by agricultural land; the northern area of the base is bordered by the community of Knob Noster; and the western area of the base is bordered by Knob Noster State Park and residential areas. The MSB contains the flightline and related facilities, military family housing units, administrative offices, operational support facilities, hospital, and other facilities.

The MM II ICBMs are deployed in 150 underground steel-reinforced concrete LFs in a deployment area of approximately 5,300 square miles surrounding the MSB. The proposed deactivation procedure entails removing the roughly 58-foot, 36-ton MM II missile from the LF and removing certain critical components, classified items, and equipment that may be reused. The shallow-buried underground fuel storage tanks would be excavated and removed; however, the deep-buried underground fuel storage tanks would be permanently closed by filling with an inert solid material. Limited quantities of hazardous materials, such as polychlorinated biphenyls (PCBs), have been identified and would be properly removed, as necessary, and the sites would be evaluated to ensure that no environmental hazards remain. After these activities have occurred, the headworks of the launch tube would be demolished with explosives or by mechanical means. Only the minimum amount of explosives would be used to implode the concrete and steel of the headworks into the

launch tube. The entire launcher would be filled with rubble and sealed with a concrete cap below ground level. Fill would be placed in excavations to level the site.

All LFs in the deployment area would be deactivated (T-12, a training launch facility on the base, would be retained) and disposed of by three methods, the first method being the preferred method of disposal. The first method is governed under 10 USC 9781 (Public Law 100-180). Under this method, the site tracts that are surrounded by lands that are adjacent to such tracts and are owned in fee simple by one owner or one owner jointly, in common, or by the entirety, would be offered at fair market value to the aforementioned party or parties. If the property cannot be disposed of under the first method, excess real property would be disposed of through the Air Force or other appropriate Federal agencies, such as the Army Corps of Engineers or the General Services Administration.

After removal, the missile components would be transported to Whiteman AFB. The rocket motors would be shipped from the missile support base to Hill AFB, Utah; and the guidance system would be shipped to Hill AFB, Newark AFB, Ohio, or Pueblo Army Depot, Colorado. An environmental assessment of the potential environmental impacts of the transport and disposition of the rocket motors has been completed by the Air Force Logistics Command (AFLC) (USAF OO-ALC, 1991). Based on the results of the study, a finding of no significant impact was made. The reentry vehicles are to be transported to Department of Energy locations using safe, secure transport assets. The risk of impacts resulting from handling, transporting, and decommissioning reentry vehicles is negligible and has been evaluated by DOE. The procedures for shipping missile components are routinely followed as MM II missiles are continually being refurbished and modernized.

Supporting the 150 LFs are 15 launch control facilities (LCFs). The command and control capabilities of the LCFs would be deactivated in a manner similar to the LFs, except for the demolition activities. The launch control center (LCC) and launch control equipment building (LCEB) at the LCFs are approximately 40 feet below the surface facilities and would be disabled by removing equipment, welding the access doors, removing the elevator, filling the elevator shaft with rubble, and capping the shaft. The aboveground facility structures would remain intact. All LCFs would be fully deactivated, with the exception of Oscar-1, located on the base. This site would be retained as a future museum with a working elevator and access to the LCC and LCEB. It is anticipated that the proposed deactivation process would occur over approximately 3 years. The fully deactivated LCFs would be disposed of through sales at fair market value to surrounding landowners, or through the General Services Administration.

Alternatives to the proposed action at Whiteman AFB include: continued operation (no action); partial deactivation; and missile removal and system shutdown. Changing the MM II MW selected for deactivation or conversion was considered but eliminated from further evaluation because conversion activities have already begun at Malmstrom AFB and deactivation of the MM II system is ongoing at Ellsworth AFB. Possible implementation alternatives within the proposed action include delaying the deactivation for 1 year, removing the hardened intersite cable system (HICS), removing deep-buried underground storage tanks (USTs), leaving the launcher headworks intact, and demolishing the launcher headworks mechanically. The reuse of the aboveground facilities by the Air Force (other

than the use of Oscar-1 as an operating museum) was considered as an implementation alternative but eliminated from further consideration because the Air Force has no plans to reuse the offsite MM II facilities.

If the no action, partial deactivation, missile removal and system shutdown alternatives, or the non-demolition implementation alternative were instituted and START is later ratified, deactivation and dismantlement could subsequently occur to meet the requirements specified in the Treaty.

The cumulative impacts of the proposed action occurring concurrently with the transfer of the 442nd Fighter Wing (FW) with A/OA-10 aircraft from Richards-Gebaur AFB, Missouri, and the activation of the 509th Bomb Wing (BW) with B-2 and T-38 aircraft, and other reasonably foreseeable actions at Whiteman AFB and the surrounding area, were also assessed.

The following areas of concern have been identified during evaluation of the affected environment: air resources; geological resources; water resources; biological resources; cultural, archaeological, and paleontological resources; health and safety/hazardous materials/solid waste; noise; and transportation. Because the physical impacts of the deactivation would also affect the human environment, 40 CFR 1508.14 requires that socioeconomic impacts be assessed. For these areas of concern, potential environmental consequences associated with the proposed action and alternatives were evaluated, and possible impact mitigations were suggested.

The no action alternative, continued operations, would not result in any new significant impacts. Ongoing impacts from the 351 MW mission include:

- Soil sterilization around the LFs and LCFs causes potential herbicide residue accumulation in the soil.
- Wear on service roads used by transporter-erector (TE), reentry vehicle guidance and control (RV/G&C) vans, and other MM II vehicles causes erosion and siltation.
- Vehicular traffic associated with operations and maintenance of the MM II workforce causes air pollutant emissions.
- The MM II workforce uses utilities (water, sewage, energy) and services (police, fire, health care, schools).
- Operation and maintenance of the MM II system causes direct and indirect employment.

Adverse impacts were classified as significant or insignificant, and the period of impact was assumed to be long term unless noted as short term (temporary). Beneficial impacts were noted where applicable. A resource that was negligibly affected by an activity was considered to be insignificantly impacted.

IMPACTS OF THE PRC SED ACTION

Air Resources. Under tl . oposed action, no significant short-term impacts to air quality are anticipated. Air emissions (primarily carbon monoxide, sulfur oxide(s), nitrogen oxide(s), hydrocarbons, and particulate matter) would result from the use of equipment at the LFs and LCFs, aircraft operations at the MSB, vehicles on base and moving to and from the sites, and explosive demolition of launcher headworks (small amounts of dust from the surrounding ground and flakes of lead-based paint from the walls of the launchers to be entrained in the blast—no large pieces of debris are likely to be ejected from the launch tubes). Additional short-term emissions would originate from an increase in helicopter missile support missions from Whiteman AFB during the deactivation.

The air quality in the deployment area is good, and ambient air quality is not projected to exceed the National Ambient Air Quality Standards (NAAQS) under any alternative. Missouri has adopted the NAAQS as a measurement of air quality. The proposed action would conform with the Clean Air Act 1990 Amendments to Section 176 because no air quality violations are now attributable to Whiteman AFB, the area is in attainment for all criteria pollutants, and no violations would occur. Over the long term, deactivation of the MM II system would result in beneficial, but insignificant, impacts to air quality around the MSB and deployment area by decreasing the number of vehicles that use the roads and by decreasing the number of C-141 flights (used to transport rocket motors) and helicopter flights.

Geological Resources. The proposed action presents the possibility of adverse impacts to the geological resources of the region. Large amounts of fill would be excavated from borrow pits or overburden, and demolition would occur at 150 LF sites. Existing commercial borrow pits would be used. The potential is minor for geological slumping (sudden movement of soil and/or rock downslope) from explosive demolition events in the west and southwest portions of the deployment area. If explosive demolition is used, other factors limit the possibility of slumping: only one blast of approximately 500 pounds of explosive is anticipated at each LF; the LFs are 4 or more miles apart; and the LFs are generally located in flat areas away from the slump-prone rocks. The deployment area is structurally stable, and no triggering of earthquakes from the use of explosive demolition techniques is expected. No impacts to reclaimed surface mines or oil field and natural gas production areas in the deployment area would be anticipated from any demolition event.

The large amount of fill necessary to restore the level of the demolished LFs could lead to additional erosion at existing borrow areas. Because the soils of the deployment area are poorly developed and exhibit a moderate to high potential for wind and water erosion, excavations at the LCFs and LFs could escalate erosion of the surrounding soil. No significant impacts from eroded soil containing pesticide residues, specifically the herbicide prometon, would occur. The soils and vegetation would recover over a few years or less.

Water Resources. Ground-water and surface-water quality and quantity could be adversely affected by MM II system deactivation. Principal aquifers supplying potable water in the deployment area are deeper than 100 feet. Although unlikely, ground attenuation from explosive demolition could cause some microfracturing of material in carbonate

aquifers, modifying the quantity of ground water in shallow aquifers, as well as potentially causing water seepage from reservoirs. The yield of the aquifer could decrease or increase, depending on the structure of the area. It is possible that the impacts of explosive demolition could decrease the yield of some shallow wells located near LFs and significantly decrease the quantity of water available. Only the minimum amount of explosives necessary would be used to disrupt and implode the steel and concrete of the headworks into the launch tube. In most instances, the characters of reservoirs and shallow aquifers would change only minimally, if at all. Deep aquifers are not expected to be affected under any alternative because of the thick interbeds of shale, a rock of very low permeability, prevalent within the aquifers. Borrow pit excavation effects on shallow aquifers would be negligible because excavation would occur at existing commercial borrow pits designed to avoid intercepting the water table.

Seepage of ground water into some launch tubes, LCCs, and LCEBs is inevitable. A lead-based paint, which may also contain mercury, chromium, and other common heavy-metal paint additives, was used to paint the interiors of these structures. Some cadmium electroplating was also performed in these areas. Ground-water seepage into these areas could cause heavy metals to leach into the ground water and possibly migrate from the immediate area. The predicted concentration of lead modeled over a 20-year period is a fraction of one part per billion and would not add significantly to background levels in ground water from wells down-gradient from the LFs or LCFs. Concentrations of other heavy metals are expected to be less than the lead levels and would also be at least an order of magnitude lower than the maximum contaminant levels for those metals.

The quality of water in the deployment area would not likely be significantly affected by any deactivation activities. Exception for potential ground-water yield reductions, the projected adverse impacts are only short term. Surface water seepage would eventually return to original rates because of weathering of fractured carbonate rock (limestones and dolomites) and filling of the fractures with silt-loam soils.

Biological Resources. No significant or long-term impacts to biological resources are expected for the proposed action. If demolition occurs, animals (including waterfowl and threatened, endangered, and candidate bird species) could be startled. The U.S. Fish and Wildlife Service was informally consulted about the presence of threatened, endangered, and candidate species within the deployment area. Although eight animal species and two plant species may occur in the deployment area or in or near Whiteman AFB, these area contain no designated critical habitat. Because of the limited periods of explosive activity and the distance between sites, birds and other mammals would not be significantly affected by explosive demolition.

The soils of the deployment area exhibit a moderate to high potential for erosion; it is likely that erosion would occur during deactivation. Erosion could lead to runoff or airborne transport of sediments that could enter streams, resulting in a short-term adverse impact to aquatic resources. Particulate matter from erosion and emissions from construction equipment and headworks demolition would also settle on the surrounding vegetation. No significant impacts to vegetation from the air-borne chemicals and particulate matter are anticipated.

Cultural, Archaeological, and Paleontological Resources. No structures listed in the National Register of Historic Places (NRHP) are located on Air Force property in the deployment area. Although there are some structures within 5 miles of the LFs and LCFs, these structures would not be significantly affected by deactivation activities. The demolition specifications are designed to prevent damage to nearby structures, which would include listed and potential NRHP sites.

The construction and deployment of the MM II missile system is a significant event in the history of Missouri and the United States. According to the U.S. Department of the Interior, the MM II missile system is eligible for nomination to be listed on the NRHP; therefore, complete deactivation of the system, including the LCFs, and demolition of the LFs would have a significant, adverse long-term impact on this potentially historic resource. However, the Air Force plans to retain Oscar-1, the on-base LCF, and preserve it as an operating museum. Plans also include preserving the on-base LF. Other possible mitigation measures to preserve the historical significance of the MM II system include preparing documentation on the historical significance of the missile system, and recording the locations of the LFs and other LCFs with brass plaques.

Few Native American resources are expected to exist adjacent to the LFs. Because no Federal Native American lands are located in the deployment area, noise of demolition activities would not disrupt religious or traditional ceremonies. No significant impacts to paleontological resources are anticipated because proposed activities would occur in previously disturbed areas with negligible potential for discovery of significant fossils relevant to the understanding of the associated paleontological community.

Health and Safety/Hazardous Materials/Solid Waste. No significant adverse impacts involving the health and safety of workers and the public, or exposure to hazardous materials and solid waste are anticipated. The proposed action would involve removing toxic and hazardous materials from the deployment area. The public would receive obvious benefits from the removal of these materials. Workers would be handling a number of hazardous materials, including diesel fuel, PCBs, sodium chromate solution, and lead-based paint. Workers would also be handling and removing asbestos-containing materials. Workers handling asbestos-containing materials and hazardous materials and wastes would follow guidelines and regulations for using protective clothing and gear designed to prevent or demonstrably reduce the potential for exposure to hazardous substances. Therefore impacts from the proposed deactivation action would be negligible as long as the required equipment and clothing were used.

The Air Force is preparing a sampling plan to look at possible contamination of soils from past activities at LFs and LCFs. Three random sites will be sampled as part of a reconnaissance program. The Air Force will meet with representatives from the Missouri Department of Natural Resources to determine potential further actions to ensure that there is no significant health or environmental risk attributable to the LF and LCF sites.

Demolition explosives would be stored and handled in accordance with DoD Ammunition and Explosives Safety Standards to preclude significant adverse impacts involving the health and safety of workers and the public.

Assuming a constant rate of personnel accidents per man-hour, the number of injuries at the LFs and LCFs would increase insignificantly because of the increased workload. Heightened awareness through safety training and inspections would help mitigate any increase in personnel accidents.

Heavy metals in paint and electroplated steel are not scheduled for removal from the launch tube, LCC, and LCEB. Before demolition would begin, a representative sample of the potential waste stream material would be taken to perform a toxicity characteristic leaching procedure (TCLP) test. If levels of a heavy metal meet or exceed the prescribed criterion, which is unlikely, the material would be considered a hazardous waste and the deactivated facilities could be regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA), implemented in the State by the Missouri Hazardous Waste Management Rules. If the TCLP levels do not meet or exceed the criteria, each site could be subject to regulation under Subtitle D of RCRA (implemented by the Missouri Solid Waste Rules) as a solid waste landfill. For waste that is being left in place and covered, solid waste disposal area deed notices may be required pursuant to the Missouri Solid Waste Management Law and regulations promulgated from the Law. If the sites are found to contain hazardous substances, the Air Force would be subject to future liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and be subject to Federal and State hazardous waste regulations. The Air Force would follow requirements for permits and long-term monitoring.

Noise. No significant adverse impacts to receptors or structures are predicted for the proposed action. The noise from explosive demolition could annoy humans and wildlife during its several-second period. Sound levels of approximately 135 decibels are predicted within 400 feet of an LF. Because each LF is approximately 4 miles from another LF and only one demolition blast would likely be needed for each LF, the temporary nature of the effect would not significantly affect human hearing or physiological health.

Noise from the construction equipment at the LFs and LCFs would be fairly continuous during dismantlement activities, except for a minimum 90-day period after LF headworks demolition for START verification purposes. Each LF site would subsequently be filled and graded. The construction activities at each site would occur over several weeks. The noise levels from construction equipment would be approximately 60 decibels within one-quarter mile of a site and occur continuously throughout a work day. Traffic noise adjacent to the roads traveled by construction and worker vehicles could exceed 70 decibels, but would only occur sporadically.

The additional traffic noise would insignificantly affect the ordinarily quiet environment of the deployment area. After deactivation, noise levels along roads and near the LFs and LCFs in the deployment area would be reduced compared to current levels; an insignificant change in ambient noise levels would occur over the entire deployment area. Noise associated with air operations under the proposed action (mostly C-141 flights) would increase slightly over baseline levels; however, no significant noise impacts from flight operations are anticipated.

Transportation Traffic flow in the deployment area, accident rates, and road repair/maintenance would be negligibly and insignificantly affected under the proposed action. The level of service for the roads to and within the deployment area, and the balancing of an increase in construction vehicles with a decrease in Air Force vehicles, precludes a significant short-term impact from occurring under the proposed action. Over the long term, a decrease in road maintenance funding and the gradual deterioration of roads would be partly offset by a decrease in traffic, including heavy vehicles such as transporter-erectors.

Socioeconomics. The proposed action could cause significant adverse socioeconomic impacts if the 509 BW was not based at Whiteman AFB. Full deactivation of the MM II system would decrease Whiteman AFB's workforce by 1,648 personnel, resulting in a new employment baseline at Whiteman AFB of about 2,060 workers in 1995. In turn, these reductions would affect population, employment, housing, retail businesses, and school enrollment in the three counties (Johnson, Pettis, and Henry) where 97.6 percent of the workforce lives. Approximately 81 percent of off-base personnel live in Johnson County, which would incur the primary impacts. Pettis and Henry Counties would experience insignificant impacts to socioeconomic resources.

As a result of the deactivation, Johnson County's 1995 population would be 6.7 percent below the projected population, a significant adverse impact.

The deactivation would result in an additional 932 secondary jobs lost in the community because of the multiplier effect, for a total loss of 2,580 jobs. Johnson County would lose 2,100 of these jobs, more than 9 percent of the county job base; this would be a significant adverse impact.

Housing vacancy rates in Johnson County could increase from their current level of 5.3 percent to about 14 percent in 1995, a significant adverse impact. The small communities of Knob Noster and La Monte, where Whiteman AFB personnel constitute a large proportion of the total community population, would experience an even more significant adverse impact from extremely high vacancy rates and declines in local property values.

The loss of 3,600 people from retail trade areas in the three counties would have an adverse effect on sales and business receipts. The impact would be significant in Johnson County, which could experience a loss of $14.5 million (more than 6 percent) in retail and service business by 1995.

Knob Noster and Warrensburg School Districts, both in Johnson County, are expected to incur significant school enrollment impacts, with total losses of 22 percent and 17 percent of enrollment, respectively. Federal impact aid losses are expected to be insignificant.

Land use and utility impacts are related to the LF and LCF deactivation process, and could occur primarily in the rural areas of the 14-county deployment area where the LFs and LCFs are located. Adverse, but insignificant, short-term impacts to land use would occur in the immediate vicinity of the LCFs and LFs; however, long-term land use impacts are expected to be insignificant. Removal of the line-of-sight poles and azimuth markers (to be done only

at a landowner's request) would cause very localized, short-term adverse impacts in the vicinity of the marker. Insignificant utility impacts to suppliers of electricity to LFs and LCFs are expected to occur.

IMPACTS OF THE PARTIAL DEACTIVATION ALTERNATIVE

The physical impacts associated with the partial deactivation (one or two missile squadrons deactivated) of the MM II system for deactivated sites would be identical in type and magnitude to those projected to occur under the proposed action (full deactivation). In addition, the impacts occurring under current operations would continue at the sites in the squadron(s) that would not be deactivated. The partial deactivation of one missile squadron would not be expected to significantly affect the three-county primary area. However, a significant economic impact on employment and population is expected to occur in Johnson County if two squadrons were deactivated.

IMPACTS OF THE MISSILE REMOVAL AND SYSTEM SHUTDOWN ALTERNATIVE

The extent of physical disturbances and impacts associated with this alternative would be distinctly less than with the proposed action. No explosive demolition of the launcher headworks would occur and less fill would be required. No significant physical impacts are projected to occur. It is possible that significant adverse socioeconomic impacts could occur. The potential socioeconomic impacts resulting from missile removal and system shutdown are anticipated to be less than under the proposed action. The Air Force has not estimated the manpower requirements for maintaining a system shutdown and maintenance crew.

IMPACTS OF THE NON-DEMOLITION IMPLEMENTATION ALTERNATIVE

The adverse physical impacts of this alternative would be insignificant over the short term, with the long-term benefit of no further operations in the deployment area. Because explosive demolition would not occur under this implementation option, the physical resources in the deployment area would be considerably less affected than under alternatives that would use explosives. The overall impacts on physical resources would be greater than those predicted for the missile removal and system shutdown alternative, but still would be insignificant. The positive employment impacts resulting from demolition activities for the MM II system would be reduced because there is less construction activity associated with leaving the headworks in place. Other socioeconomic impacts would be nearly identical to those estimated for the proposed action.

IMPACTS OF THE MECHANICAL DEMOLITION IMPLEMENTATION ALTERNATIVE

Mechanical demolition of the headworks would create more dust and equipment emissions than would occur from explosive demolition. In addition, the noise from mechanical demolition of a headwork would create less noise, but occur over 1 week or more rather than several seconds. Mechanical demolition would startle the animals less than explosive demolition, although the noise annoyance would be longer.

Although unlikely, ground attenuation from explosive or mechanical demolition could cause some microfracturing of underlying rock, modifying the quantity of ground water in shallow aquifers, as well as potentially causing seepage of water from reservoirs. The yield of the aquifer could decrease or increase, depending on the structure of the area. It is not anticipated that significant physical impacts would occur from implementing this alternative, except that the accident rate for construction workers could significantly increase.

Because more workers would be required to perform this option, there would be an insignificant but beneficial impact on local employment. The decision to use mechanical demolition would provide an opportunity to use more local construction labor and contractors, resulting in an insignificant but beneficial impact to the Region of Influence (ROI). Explosive demolition, which is more specialized than mechanical demolition, is usually conducted by explosive specialty contractors located outside of the local area, therefore resulting in an insignificant impact within the ROI.

IMPACTS OF THE HICS REMOVAL IMPLEMENTATION ALTERNATIVE

The impact of removal would be significantly adverse to water, soil, and biological resources. If the HICS were removed, further air emissions from equipment and dust would occur, and narrow strips of land over 1,700 miles in total length would be disturbed. Soil erosion and siltation of surface water would occur to a greater extent under this implementation alternative than under the proposed action. Excavation could also occur in wetlands and other sensitive habitat areas. Complete HICS removal would have insignificant, beneficial impacts on local employment and significantly adverse impacts on land use.

IMPACTS OF THE ONE-YEAR DELAY OF DEACTIVATION IMPLEMENTATION ALTERNATIVE

Under this implementation alternative, the impacts would be the same as those identified for the proposed action, but with a delay of 1 year.

REMOVAL OF DEEP-BURIED USTs IMPLEMENTATION ALTERNATIVE

There is no significant difference between the impacts of leaving the deep-buried USTs in place or removing them.

CUMULATIVE IMPACTS

The cumulative physical impacts of deactivating the MM II missile system and basing the 509 BW and 442 FW at Whiteman AFB would likely be insignificant. The potential for impact to the biophysical environment from the B-2, T-38, and A/OA-10 basing action would likely occur in the immediate confines of the base boundaries, while the impacts from the deactivation would primarily occur throughout the deployment area. The cumulative socioeconomic impacts would be less severe, only insignificantly adverse in the long term, when compared to the socioeconomic impacts likely to occur without new missions arriving at the base. There could be a net decrease of approximately 350 personnel assigned to

Whiteman AFB, resulting in a loss of about 175 indirect jobs in the community, decreased school enrollment, decreased retail and service business, and increased housing vacancy rates. There could be some short-term adverse effects on socioeconomic resources from the fluctuations in incoming and outgoing personnel.

The cumulative impacts of no action for the MM II system action and the basing of aircraft missions at Whiteman AFB could be significantly adverse. An estimated 1,500 additional base employees could be assigned to the base over an eight-year time period, increasing population in the region of influence by approximately 3,300. Depending on when the personnel increases occur, the existing capacity of housing and educational resources in the region could be stressed. The increased population and growth in housing demand could adversely affect land use if proper land-use planning principles are not used to plan for this growth, which would likely occur primarily in Johnson County.

A delay in deactivating the MM II system for 1 year, when considered with the proposed basing of the B-2 bomber at Whiteman AFB, could cause larger fluctuations in personnel numbers at Whiteman AFB than projected under the scenario of the MM II proposed action starting in October 1992. These larger fluctuations would be attributable to the retention of 351 MW personnel while the B-2 personnel are arriving. This scenario could stress socioeconomic resources, including schools, housing, and public services.

The cumulative impact of partial deactivation involving only one or two of the three squadrons of the 351 MW and future aircraft missions could result in less fluctuation in base employment than projected under the other scenarios and result in a smoother transition for schools and the housing market. There would be a net increase in personnel at Whiteman AFB if this scenario occurred.

The cumulative socioeconomic impacts for the other MM II deactivation and implementation alternatives (missile removal and system shutdown, non-demolition, mechanical demolition, removal of the HICS, and removing the deep-buried LCF USTs), when considered with the proposed future aircraft missions at Whiteman AFB, would be almost identical to those likely to occur with the total deactivation of the MM II system.

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ACRONYMS AND ABBREVIATIONS

ACC	Air Combat Command
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
AFB	Air Force Base
AFLC	Air Force Logistics Command
AFMC	Air Force Materiel Command
AFSPCOM	Air Force Space Command
AFR	Air Force Regulation
AFSC	Air Force Systems Command
AICUZ	Air Installation Compatible Use Zone
AMC	Air Mobility Command
ANFO	ammonium nitrate with fuel oil
ANGB	Air National Guard Base
ARS	Air Rescue Squadron
ASU	automatic switching unit
ATSDR	Agency for Toxic Substances and Disease Registry
BCE	Base Civil Engineer
BOD	biochemical oxygen demand
BW	Bomb Wing
C-E-Q	cause-effect-questions
CAA	Clean Air Act
$CaCO_3$	calcium carbonate
CEMIRT	Civil Engineering Maintenance Inspection and Repair Team
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CIP	Capital Improvements Program
CMSU	Central Missouri State University
CO	carbon monoxide
COE	Corps of Engineers
CREAMS	Chemicals, Runoff, and Erosion from Agricultural Management Systems
CSR	Code of State Regulations
CY	cubic yards
dB	decibel
DEB	Design Engineering Branch
Det	Detachment
DEU	diesel electric unit
DEV	Environmental Engineering Branch

DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EA	environmental assessment
ECS	environmental control system
EIAP	environmental impact analysis process
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
ERIS	Economic Resource Impact Statement
ESA	electrical surge arrestor
ETIS	Environmental Technical Information System
FEIS	final environmental impact statement
FONSI	finding of no significant impact
FS	Feasibility Study
FW	Fighter Wing
FY	fiscal year
GLEAMS	Groundwater Loading Effects of Agricultural Management Systems
GOV	government-owned vehicle
GPM	gallons per minute
GSA	General Services Administration
HAP	Homeowners Assistance Program
HC	hydrocarbons
HEPA	high-efficiency particulate air
HICS	hardened intersite cable system
HMTA	Hazardous Materials Transportation Act
HQ SAC	Headquarters, Strategic Air Command
HUD	Department of Housing and Urban Development
ICBM	intercontinental ballistic missile
IMPSS	improved Minuteman physical security system
IND	Inadvertent Nuclear Detonation
IRP	Installation Restoration Program
ISCST	Industrial Source Complex—Short Term
LCC	launch control center
LCEB	launch control equipment building
LCSB	launch control support building
LCF	launch control facility
LCFSB	launch control facility support building
LCSB	launch control support building

L_{dn}	day-night average sound level
LEIS	legislative environmental impact statement
LER	launcher equipment room
LF	launch facility
LFSB	launch facility support building
LOS	level of service
µg/L	micrograms per liter
MAC	Military Airlift Command
MACL	Missouri Air Conservation Law
MCL	maximum contaminant level
MDNR	Missouri Department of Natural Resources
mg/L	milligrams per liter
MGD	million gallons per day
MGSs	missile guidance sets
MILE	Minuteman Integrated Life Extension
MM	Minuteman
MPP	Minuteman power processor
MPSC	Missouri Public Service Company
MS	Missile Squadron
MSA	Metropolitan Statistical Area
MSB	missile support base
MT	missile transporter
MW	Missile Wing
$Na_2CrO_4 \cdot 10H_2O$	sodium chromate
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NOEL	no observed effect level
NOI	notice of intent
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide(s)
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSP	normal sewage parameter
NSPS	New Source Performance Standards
O&M	Operations and Maintenance
OHSC	Oil and Hazardous Substance Contingency Plan
OO-ALC	Ogden Air Logistics Center
OSHA	Occupational Safety and Health Act
O_3	ozone

PA	Preliminary Assessment
Pb	lead
PCB	polychlorinated biphenyls
PEL	permissible exposure level
PL	public law
PM	particulate matter
POV	privately-owned vehicle
PSD	Prevention of Significant Deterioration
PWSDs	Public Water Supply Districts
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REA	Rural Electrification Administration
RFI	radio frequency interference
RI	Remedial Investigation
ROI	region of influence
RRRP	Resource, Recovery, and Recycling Program
RSMo	Revised Statutes of the State of Missouri
RV	reentry vehicle
RV/G&C	reentry vehicle guidance and control
SAC	Strategic Air Command
SALT	Special Area Land Treatment
SARA	Superfund Amendments and Reauthorization Act
SC	site closeout
SHPO	State Historic Preservation Officer
SI	Site Inspection
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxide(s)
SPCC	Spill Prevention Control and Countermeasure Plan
SPR	Spill Prevention and Response Plan
SSB	soft support building
SSCBM	shipping and storage container for ballistic missiles
SST	safe secure transport
START	Strategic Arms Reduction Treaty
TAC	Tactical Air Command
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TE	transporter-erector
TLV	threshold limit value
TNT	trinitrotoluene
TOVEX®	ammonium nitrate slurry with monomethylamine thickener
tpy	tons per year

TSCA	Toxic Substances Control Act
TSP	total suspended particulates
UHF	ultra high frequency
U.S.S.R.	Union of Soviet Socialist Republics
USACERL	U.S. Army Corps of Engineers Construction Engineering Research Laboratory
USAF	United States Air Force
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNRC	U.S. Nuclear Regulatory Commission
USSTRATCOM	U.S. Strategic Command
UST	underground storage tank
UTTR	Utah Test and Training Range
WSA	weapons storage area
WWTP	wastewater treatment plant
XRQ	Directorate of ICBM Requirements

CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The Air Force is contemplating deactivation of the entire Minuteman II (MM II) missile system, the oldest deployed missile system in the United States' intercontinental ballistic missile (ICBM) force. Older missiles such as the Titan I and II and MM I have already been retired; deactivation of the MM II system would leave the newer MM III and more recently deployed Peacekeeper as the remaining elements of the ICBM force.

The first MM II missile system was activated in 1966, and the last in 1972. Until recently, the Air Force had been upgrading and modernizing the MM II system since its installation. On September 27, 1991, President Bush called for an immediate standdown of the MM II missile system, and all missiles were taken off full alert and put on standby status. Deactivation of the MM II system at Ellsworth Air Force Base (AFB), SD, began in November 1991; and conversion of the MM II system to an MM III system at Malmstrom AFB, MT, began in October 1991. The Air Force proposes to deactivate the MM II missile system at Whiteman AFB beginning in late 1992. Minuteman II missiles from the three AFBs will be retired over the next 5½ years.

The underlying purpose of and need for the proposed action is twofold: to remove the oldest system from the ICBM force while retaining the most cost-effective strategic deterrence in the context of the budget and resources available to the Department of Defense (DoD), and to meet the expectations of the strategic arms reduction agreements.

Although the proposed action is planned primarily to meet budget and program incentives, the limitations on nuclear warheads and launchers required in a ratified strategic arms reduction treaty also influence the need for the proposed action. To meet the overall limitations, reductions would be made in the number of ICBMs and their launchers, sea-launched ballistic missiles and their launchers (submarines), and heavy bombers. It is assumed the launch tube at an ICBM launch facility must be destroyed to allow credit for a reduction in launcher numbers.

The MM II missile systems, which include launch facilities (LFs) and launch control facilities (LCFs), are operated and maintained by the 351st Missile Wing (MW) at Whiteman AFB near Knob Noster, MO; the 341 MW at Malmstrom AFB near Great Falls, MT; and the 44 MW at Ellsworth AFB near Rapid City, SD (figure 1.1-1). Before the aforementioned deactivation and conversion activities, these three bases each maintained 150 MM II missiles in extensive deployment areas outside the missile support base (MSB).

This environmental impact statement (EIS) was prepared to evaluate the potential environmental impacts associated with a proposed action, as required by the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ)

implementing regulations [40 Code of Federal Regulations (CFR) 1500-1508], DoD Directive 6050.1, and Air Force Regulation (AFR) 19-2.

The Air Force plans to deactivate the MM II missile system at Whiteman AFB over approximately 3 years, beginning in fiscal year (FY) 1993. The deactivation at Whiteman AFB would rely on the same methods and techniques used to deactivate the 44 MW at Ellsworth AFB. However, it is likely that the deactivation process will be refined based on the experiences at Ellsworth AFB. The environmental documentation supporting the deactivation of the MM II MW at Ellsworth AFB (USAF, 1991f) and the conversion of the MM II to the MM III system at Malmstrom AFB (USAF, 1991e) were prepared separately. A record of decision based on the findings of the final EIS on the MM II deactivation program at Ellsworth AFB was signed on November 18, 1991, and a finding of no significant impact (FONSI) based on the final environmental assessment (EA) on the MM II conversion program for Malmstrom AFB was signed on October 2, 1991.

Chapter 2 of this document describes the proposed action and alternatives to, and within, the action. Chapter 3 describes the environmental and socioeconomic resources that would potentially be affected by the proposed action or alternatives. The potential impacts of implementing the proposed action or alternatives are described in chapter 4. The cumulative impacts of the action, as well as other reasonably foreseeable actions (including the basing of the B-2 aircraft at Whiteman AFB) are discussed in chapter 5.

The missile system is operated and owned by two distinct entities. The Air Combat Command (ACC) is the custodian and operator of the MM II missile system whereas the single point weapons system manager is the Air Force Materiel Command (AFMC). For the deactivation process, ACC is responsible for removing the missile components from the LF and transporting the missile components to the MSB. The AFMC is responsible for transporting the MM II rocket motors and missile components, except for the reentry vehicles (RVs), from the MSB to their final destination. Transportation and disposition of missile components are governed by various regulations and specifications (see section 1.4). The AFMC prepared an environmental assessment (EA) titled "Environmental Assessment for the transportation and storage of missile motors from the Minuteman II missile deactivation program" on the transport of the rocket motors from the MSB to Hill AFB, UT, and their storage at Hill AFB or the Utah Test and Training Range (USAF OO-ALC, 1991). No new construction or land use changes would occur at Hill AFB and no new procedures would be implemented. The Air Force has been handling and transporting boosters for more than 30 years and has an excellent safety record. Because of the demonstrated low probability of an accident, the transportation risk is negligible. The only change in the environment would be a slight increase in air, highway, and rail traffic during the duration of the deactivation/ conversion programs. Over the long term, rocket motor shipments between Whiteman AFB and Hill AFB would cease, and the overall shipments between missile bases and Hill AFB would decrease. The AFMC EA concluded that there would be no significant impacts from the transportation and storage of rocket motors. Consequently, a finding of no significant impact (FONSI) was signed on September 27, 1991. As recommended under regulations promulgated from NEPA, the AFLC EA is incorporated by reference

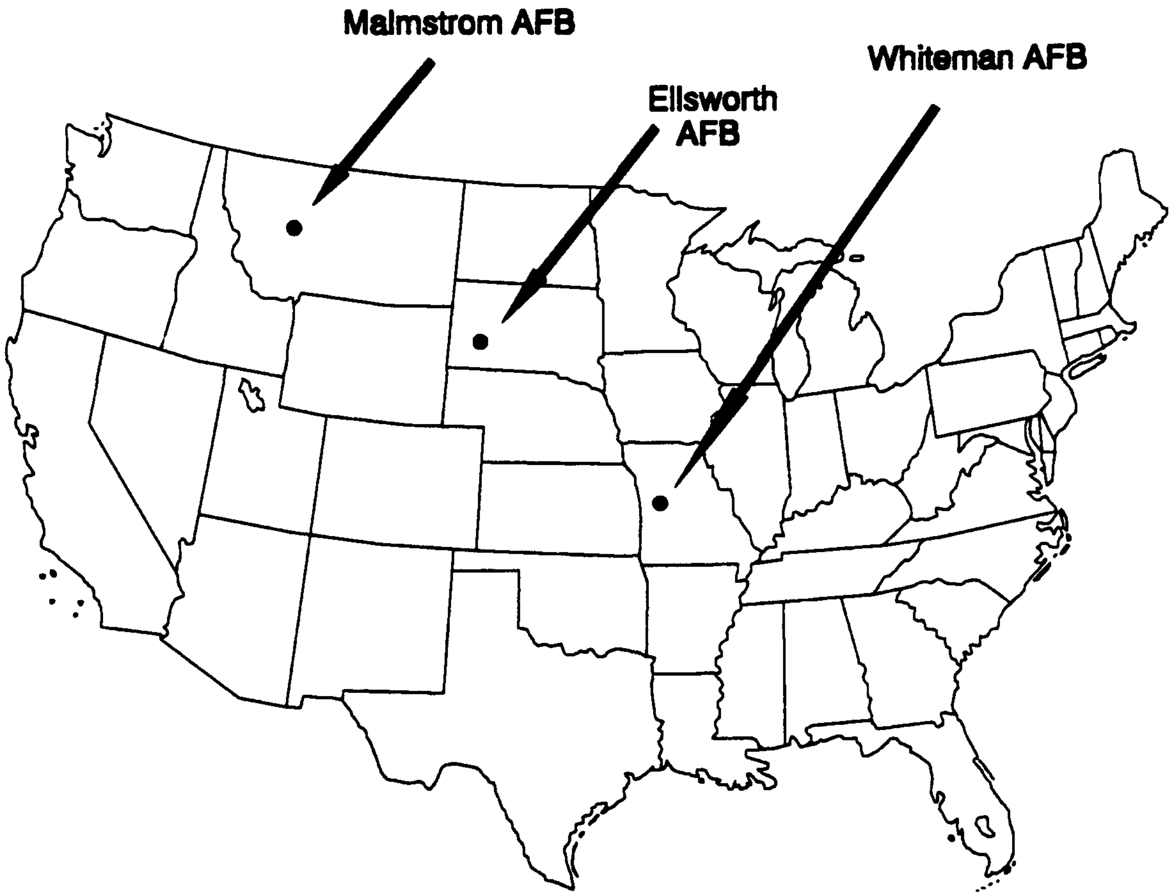

Figure 1.1-1 Location of Minuteman II Missile Systems

(40 CFR 1502.21) into this EIS. Copies of the documents are available from Ogden Air Logistics Center at Hill AFB (telephone (801) 777-6918), HQ ACC/CEVA (telephone (804) 764-3056), and the 351 SPTG/DEV at Whiteman AFB (telephone (816) 687-6249).

With regard to rocket motor activities, chapter 4 of this EIS discusses the potential environmental impacts of rocket motor handling, movement, and storage at the MSB and in the deployment area. Chapter 5 presents the cumulative impacts of the Minuteman II activities, including rocket motor issues, at Whiteman, Ellsworth, Malmstrom, and Hill AFBs. Appendix E of this EIS further discusses safety concerns regarding the handling and transportation of rocket motors.

ACC owns the RVs and is responsible for them until they are retired. When RVs are scheduled for retirement, they are shipped to Department of Energy (DOE) facilities. If DOE transportation is backlogged, some of the RVs slated for retirement could be shipped by the Air Force to the DOE holding area; the identity and location of this area is classified. If they are shipped by DOE, they become DOE's responsibility when they leave the MSB. If they are shipped by the Air Force, they are the responsibility of the Air Force until they arrive at DOE facilities. The impacts of reentry vehicle retirement have previously been assessed in the Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (U.S. Department of Energy, 1977) and the Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy, 1983). These documents evaluated the impacts of nuclear weapon component production and the assembly, maintenance, and decommissioning of RVs. The Pantex document concluded that direct measurable effects to the health and safety of the general public or adverse impacts to the environment are likely to occur from these activities. The plant will continue to operate according to DOE standards and no significant impacts are expected on the health and safety of the general public are expected. The transportation of radioactive materials in various environments has been evaluated in several studies: Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes (U.S. Nuclear Regulatory Commission, 1977); Shipping Container Response to Severe Highway and Railway Accident Scenarios (U.S. Nuclear Regulatory Commission, 1987); Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (U.S. Department of Energy, 1977); and Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy, 1983). These studies concluded that the risks associated with such transportation are very low, although severe accidents in urban areas have the potential for large radiological and economic consequences. The analysis and findings of these studies are incorporated by reference (per 40 CFR 1502.21) into this EIS. Copies of these documents are available from the National Technical Information Service (telephone (703) 487-4600), DOE (telephone (202) 586-8800), or the Nuclear Regulatory Commission (telephone (202) 634-3273). Decommissioning of RVs and recycling of radionuclides are currently being performed at these facilities. Implementation plans for potential operational changes have been prepared for these facilities and are being evaluated to decide whether changes are necessary, what changes should be made, and how the changes should be implemented. Any significant changes in existing procedures would be evaluated in

future NEPA documents. Section 4.7.2.1 and appendix E of this EIS further discuss safety concerns about the handling and transportation of RVs.

The Air Force recently instituted a restructuring program to consolidate three commands (SAC, Tactical Air Command (TAC), and Military Airlift Command (MAC)) into two commands: Air Combat Command (ACC) and Air Mobility Command (AMC). The inactivation of the major commands and activation of the two proposed commands commenced June 1, 1992. The reorganization is expected to be completed by mid-1994. A concurrent action is the formation of a United States Strategic Command (USSTRATCOM) at Offutt AFB, NE. USSTRATCOM will exercise combat command of assigned forces on strategic alert, including intercontinental ballistic missiles, ballistic missile submarines, long-range bombers, strategic reconnaissance, and battle management assets (airborne command posts). Another action as part of the restructuring and downsizing of DoD is the consolidation of AFLC and Air Force Systems Command (AFSC) into the Air Force Materiel Command (AFMC). The formation of AFMC also began on June 1. The aforementioned actions have been evaluated for potential environmental impacts (USAF, 1991 b,c,d) and a FONSI has been signed for each action.

1.2 LOCATION OF WHITEMAN AFB AND MISSILE DEPLOYMENT AREA

Whiteman AFB is located in Johnson County in west central Missouri, 2 miles south of the town of Knob Noster, 9 miles east of the city of Warrensburg, and 65 miles southeast of Kansas City (figure 1.2-1).

The MSB encompasses approximately 3,700 acres of Air Force and leased land. The southern and eastern areas of the base are bordered by agricultural land, the northern area of the base is bordered by the community of Knob Noster, and the western area of the base is bordered by Knob Noster State Park and residential areas. The MSB contains the flightline and related facilities, military family housing units, administrative offices, operational support facilities, hospital, and other facilities.

The deployment area of the 351 MW surrounds the MSB (figure 1.2-1). The 150 LFs and 15 LCFs are separated approximately 4 to 7 miles from each other and extend over approximately 5,300 square miles. Including the transportation and cable routes to and from the deployment area, the total physical area potentially affected by deactivation would be approximately 6,000 square miles.

1.3 SCOPING HEARING PROCESS

The Air Force published a Notice of Intent in the *Federal Register* on November 14, 1991, to prepare an EIS for the deactivation of the MM II system at Whiteman AFB. Letters were sent to Federal, State, and local agencies, and civic leaders apprising them of the proposed deactivation. Press releases were provided to local newspapers, radio stations, and television stations. A scoping meeting was held on December 10, 1991, at the Knob Noster Middle School, Knob Noster, MO, to obtain input from the general public and

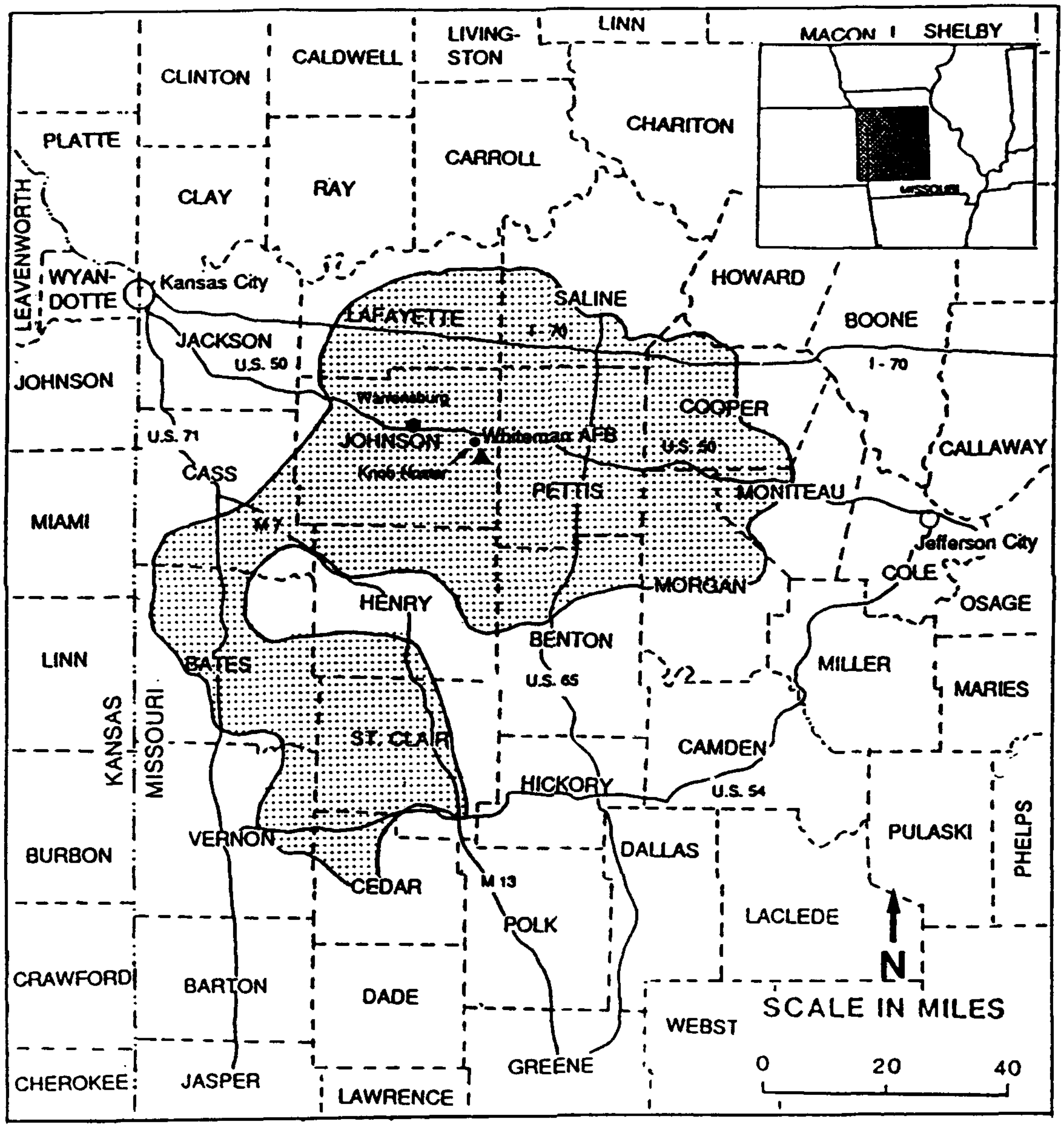

Figure 1.2-1 Whiteman AFB and the Minuteman II Deployment Area

agency personnel to help the Air Force determine the nature, extent, and scope of significant issues related to the deactivation action.

Approximately 80 people attended the scoping meeting, and 5 individuals presented verbal testimony. As part of the scoping process, written comments were also solicited. The issues and concerns of the public, along with programmatic requirements of the Air Force, were analyzed and used to develop a range of alternatives and the factors by which these alternatives could be evaluated. The issues and concerns of the public were also used to assess the impacts of the various alternatives (evaluated in chapter 4), to develop mitigation measures to be incorporated in the alternatives, and to select the preferred alternative.

The verbal and written comments that were received during the official scoping process, in addition to internal Air Force discussions about the proposed action, identified the following significant issues:

- Potential impact on housing, infrastructure, educational, and social institutions from the loss of the MM II mission, Air Force personnel, and jobs associated, both directly and indirectly, with the mission.

- Potential impact on city and county revenues.

- Potential impact on small electricity cooperatives and their customers from the loss of Air Force revenues from electricity usage for the MM II system in the deployment area and for personnel associated with the MM II system.

- Reuse of LFs and LCFs.

- Transfer of ownership of the disposed property.

- Potential impact on private and public wells from demolition of the LF headworks.

- Potential impacts to the transportation network from increased traffic and heavy equipment traveling the network to, from, and within the deployment area.

- Potential impacts to soil and water.

- Methods of handling hazardous materials and the disposition of wastes.

- Methods for ensuring that the sites will be cleaned up before disposition.

- Consideration of the B-2 basing action at Whiteman AFB concurrently with the MM II deactivation.

- Disposition of the hardened intersite cable system, fences, gates, and azimuth markers.

- Loss of military personnel and impacts on base.

- Use of military and contractor personnel during deactivation.

- Disposition of rocket motors.

- Waste recycling and reuse.

- Permitting requirements.

- Removal of underground storage tanks.

The aforementioned issues were assessed and a draft EIS was prepared. A notice of availability for the draft EIS was published in the *Federal Register* on April 17th and specified that comments on the draft EIS were due by June 1st. A public hearing to receive comments on the draft EIS was held starting at 7 PM on May 19th at the Knob Noster Middle School, Knob Noster, MO. Approximately 50 people attended the public hearing. Four individuals presented verbal testimony and one individual asked a question. In addition to the public testimony, four letters commenting on the draft EIS were received. The public testimony was recorded by a court reporter and a transcript of the hearing was prepared. Appendix H of this EIS includes a reproduction of the transcript and all comment letters. Responses to substantive comments are also included in appendix H. In preparing the final EIS, the Air Force considered all comments and revised the document as necessary.

1.4 RELEVANT FEDERAL, STATE, AND LOCAL STATUTES AND GUIDELINES

A summary of the laws, regulations, executive orders (EOs), and other types of requirements that may be applicable to the deactivation project is provided in the following paragraphs.

1.4.1 Environmental Policy

The *National Environmental Policy Act of 1969 (42 United States Code [USC] 4321 et seq.)* establishes national policy, sets goals, and provides the means to prevent or eliminate damage to the environment. NEPA procedures ensure that information about environmental impacts is available to public officials and citizens before decisions are made on major Federal actions that may significantly affect the environment. The *Council on Environmental Quality Regulations (40 CFR 1500-1508)* implement the procedural provisions of NEPA.

DoD Directive 6050.1 (32 CFR Part 214) establishes DoD policies and procedures to supplement the CEQ regulations promulgated from NEPA.

Air Force Regulation 19-2 (32 CFR 989) establishes the Environmental Impact Analysis Process (EIAP) and the specific procedural requirements for Air Force implementation of NEPA.

Executive Order 11514, Protection and Enhancement of Environmental Quality, as amended by EO 11991, sets policy for directing the Federal Government in providing leadership in protecting and enhancing the quality of the Nation's environment.

1.4.2 Air Quality

The *Clean Air Act (CAA) (42 USC 7401 et seq., as amended)* establishes Federal policy to protect and enhance the quality of the Nation's air resources to protect human health and the environment. The CAA requires that adequate steps be taken to control the release of air pollutants and prevent significant deterioration in air quality. The intent of the *Missouri Air Conservation Law (MACL)* is to maintain the purity of the air resources of the state; to protect the health, general welfare, and physical property of the people; to ensure maximum employment; and to provide for the full industrial development of the State. This law establishes the Missouri Air Conservation Commission to assist in implementing the law. Regulations are contained in the *Missouri Air Pollution Control Regulations (10 CSR 10, Chapters 1 through 5)* to meet the intent of MACL. Under the CAA, almost any air pollutant-emitting modification or new facility requires a permit. The CAA sets national primary and secondary ambient air quality standards as a framework for air pollution control. Ambient air quality standards for the State of Missouri are contained in the *Missouri Air Quality Standards (10 CSR 10, Chapter 6).* The CAA was recently revised, and the modifications are being evaluated. Section 176 of the CAA was amended and requires agency actions to conform with a State Implementation Plan's (SIP's) purpose and not cause new violations, increase the severity of existing violations, if any, or delay attainment. As of July 1, 1992, Section 608 of the Clean Air Act prohibits individuals from knowingly venting ozone-depleting compounds during maintenance, repair, servicing, and disposal of air conditioning or refrigeration equipment.

The *National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations [40 CFR Part 61], the Missouri Air Conservation Law (Chapter 643 of the Revised Statutes of the State of Missouri (RSMo)), the Emission Standards for Hazardous Air Pollutants (10 CSR 10, Chapter 6), and the interim policy letter for House Bill 77 (25 Sept. 89),* require written notification for building demolitions and asbestos abatement projects. Under the *Missouri Air Conservation Law,* written notification is required for asbestos abatement projects involving 10 square feet or 16 linear feet or more of friable asbestos-containing materials or materials that would become friable from the removal actions. Specific State certification requirements for supervisors, inspectors, and workers and removal and waste handling procedures are also outlined in the Law.

AFR 91-42 requires the base to develop and implement an asbestos operation and management program to reduce the possibility of exposure to airborne asbestos fibers.

The *Occupational Safety and Health Act (OSHA) Asbestos Standard (29 CFR 1926.58)* lists the Federal requirements for handling and removing asbestos from equipment and building structures during construction and demolition activities.

1.4.3 Water Quality

The *Clean Water Act of 1977* and the *Water Quality Act of 1987 (33 USC 1251 et seq., as amended)* establish Federal policy to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and, where attainable, to achieve a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

The Act mandates regulatory requirements for the Environmental Protection Agency (EPA) or federally authorized States to implement permit programs for regulating the discharge of pollutants to navigable waters (including wetlands) from any point source (the National Pollutant Discharge Elimination System (NPDES) (section 402)) and a permit system for the use of dredge and fill material (section 404).

The *Safe Drinking Water Act of 1974, as amended (42 USC 300f et seq.)* authorizes EPA to regulate public drinking water supplies by establishing drinking water regulations, delegating enforcement authority of drinking water standards to the States, and protecting drinking water supplies from the injection of wastes and other materials into wells. Drinking water standards were promulgated from the act by EPA. The *National Primary Drinking Water Regulations (40 CFR 141)* define maximum concentration limits of specified contaminants allowed in public water systems. The *Missouri Safe Drinking Water Act* and the *Missouri Public Drinking Water Regulations (10 CSR 60, Chapters 1-14)* contain maximum contaminant levels for microbiological contaminants, inorganic chemicals, and organic chemicals and turbidity for surface water sources.

1.4.4 Biological Resources

The *Endangered Species Act (16 USC 1531-1543)* requires Federal agencies that authorize, fund, or carry out actions to avoid jeopardizing the continued existence of endangered or threatened species or destroying or adversely modifying their critical habitat. Federal agencies must evaluate the effects of their actions on endangered or threatened species of fish, wildlife, and plants, and their critical habitats and take steps to conserve and protect these species. All potentially adverse impacts to endangered and threatened species must be avoided or mitigated.

EO 11990, Protection of Wetlands, requires Federal agencies to take action to avoid, to the extent practicable, the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The intent of EO 11990 is to avoid direct or indirect construction in wetlands if a feasible alternative is available. All Federal and federally supported activities and projects must comply with EO 11990.

1.4.5 Cultural, Paleontological, and Archaeological Resources

The primary goals of the *National Historic Preservation Act (NHPA) of 1966 (16 USC 470 et seq., as amended)*; the *Historic Sites, Buildings, and Antiquities Act, as amended;* and the *Archaeological and Historic Preservation Act* are to ensure adequate consideration of the values of historic properties in carrying out Federal activities and to attempt to identify and mitigate impacts to significant historic properties. The NHPA is the principal authority used to protect historic properties; Federal agencies must determine the effect of their actions on cultural resources and take certain steps to ensure that these resources are located, identified, evaluated, and protected. *36 CFR 800* defines the responsibilities of the State, the Federal Government, and the Advisory Council on Historic Preservation (ACHP) in protecting historic properties identified in a project area. *36 CFR 60* establishes the National Register of Historic Places (NRHP) and defines the criteria for evaluating eligibility of cultural resources to the NRHP.

The *Archaeological Resources Protection Act of 1979 (16 USC 470a-47011, as amended)* protects archaeological resources on Federal lands. If archaeological resources are discovered that may be disturbed during site activities, the act requires permits for excavating and removing any archaeological resources.

1.4.6 Health and Safety/Hazardous Materials/Solid Wastes

EO 12088, Federal Compliance With Pollution Control Standards, directs Federal agencies to comply with State and local laws and regulations concerning air, water, and noise pollution, and hazardous materials and substances to the same extent as any private party.

The *Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901), as amended by the Hazardous and Solid Waste Amendments of 1984 (public law (PL) 98-616),* is a comprehensive program for regulating and managing hazardous wastes *(Subtitle C),* nonhazardous solid wastes *(Subtitle D),* Federal procurement of reclaimed products *(Subtitle F),* and underground storage tanks *(Subtitle I).* RCRA requires Federal agencies to comply with all Federal, State, interstate, and local regulations respecting control and abatement of solid waste or hazardous waste disposal. EPA's most comprehensive regulations have been developed under the Subtitle C program that governs the generation; transportation; and treatment, storage, or disposal of hazardous wastes. Hazardous wastes are regulated in the State of Missouri under the *Missouri Hazardous Waste Management Rules (10 CSR 25, Chapters 1-13).*

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (42 USC 9601 et seq.)* provides EPA with the authority to inventory, investigate, and clean up uncontrolled or abandoned hazardous waste sites. EPA has established a series of programs to clean up hazardous waste disposal and spill sites nationwide. This act provides for funding, enforcement, response, and liability for the release or threatened release of hazardous substances into the environment.

The *Toxic Substances Control Act of 1976 (TSCA)* requires EPA to regulate the use, storage, and disposal of polychlorinated biphenyls (PCBs), and prohibits production of these compounds after January 1979. The *Missouri Hazardous Waste Management Rules (10 CSR 25, Chapter 13)* further regulate the disposal of PCBs.

The *Missouri Solid Waste Rules (10 CSR 80, Chapters 1-8)* specify requirements in the construction, modification, operation, and management of solid waste disposal facilities in Missouri. In addition, the rules outline minimum management requirements for generators of solid waste.

The *Missouri Underground Storage Tank Regulations (10 CSR 20, Chapter 10)*, which implement RCRA Subtitle I, regulate underground storage tanks holding petroleum materials and substances defined as hazardous substances under CERCLA. The regulations govern the installation, use, and closure of underground storage tanks, including corrective action for tanks that may have released regulated materials.

The *Occupational Safety and Health Act of 1971* created the Occupational Safety and Health Administration (OSHA) under the Department of Labor. The act grants the Secretary of Labor the authority to promulgate, modify, and revoke safety and health standards; to conduct inspections and investigations and to issue citations, including penalties; to require employers to keep records of safety and health data; to petition the courts to restrain imminent danger situations; and to approve or reject State plans for programs under the act. The act also established the National Institute for Occupational Safety and Health (NIOSH), the principal Federal agency engaged in research to eliminate on-the-job hazards. NIOSH is primarily responsible for identifying occupational safety and health hazards and determining necessary changes to the encompassing regulations.

The *Installation Restoration Program* is a DoD program designed to identify, confirm, quantify, and remediate suspected problems associated with past hazardous material disposal sites on DoD installations.

DoD 6055.9-STD (Ammunition and Explosives Safety Standards) and *Air Force Regulation 127-100 (Explosives Safety Standards)* establish safety criteria for storage, handling, and intentional detonation of explosives. These criteria are designed to prevent conditions that would endanger life and property both inside and outside DoD installations.

1.4.7 Noise

The *Noise Control Act of 1972 (PL 92-574), as amended by the Quiet Communities Act of 1978* establishes a Federal policy "to promote an environment free from noise harmful to health or welfare" and identifies desirable noise levels for residential areas. Federal agencies must also comply with State and local requirements for the control and abatement of environmental noise.

1.4.8 Land Use

EO 12372, Intergovernmental Review of Federal Programs, directs Federal agencies to consult with and solicit comments from State and local government officials whose jurisdictions would be affected by Federal actions.

EO 11988, Floodplain Management, requires each Federal agency to take action to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. All Federal and federally supported activities and projects are required to comply with EO 11988. Specific compliance actions are required for activities planned within a defined 100-year floodplain.

The *Air Installation Compatible Use Zone (AICUZ) Program (AFR 19-9)* provides guidance to local communities for land use planning compatible with airfield operations. This Air Force program describes existing noise and safety zones on and near the installation.

The *McKinney Act of 1987 (42 USC 11411)* authorizes the Secretary of Housing and Urban Development to enforce consideration of Federal property as possible housing for homeless individuals.

Public Law 100-180 [10 USC 7981] authorizes the Secretary of the Air Force to dispose of real property at missile sites under specific conditions.

1.4.9 Transportation

The *Hazardous Materials Transportation Act (HMTA) of 1975 (49 USC 1761)* authorizes the Secretary of Transportation to protect public health from the risks of transporting hazardous materials. These materials include explosives, flammable liquids and solids, combustible and corrosive materials, and compressed gases. The transportation of all hazardous materials must meet requirements of the HMTA. Regulations promulgated by the U.S. Department of Transportation (DOT) include requirements for packaging, handling, labeling, placarding, and shipping procedures for hazardous materials *(49 CFR Parts 171, 172 Subparts B and C, and 173 Subpart M).*

AFR 55-14 and *Department of Energy/Defense Nuclear Agency Technical Publication 4551* govern the shipment of reentry vehicles from the MSB to their destination. Shipments of radioactive materials are governed under *10 CFR 71 et seq.*

AFRs 76-1 and *122-4* govern the shipments of the missile guidance sets (MGSs). Shipments of classified MGS components, which must be escorted, are managed under *AFR 122-4*. *AFR 76-1* governs unescorted shipments of unclassified MGS components. Truck shipments of MGS components are regulated under *AFR 75-1*. *AFRs 75-1* and *75-2* govern the surface transport of rocket motor components. *AFR 71-4* regulates logistic air shipments of rocket motor components.

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CHAPTER 2
DESCRIPTION OF ACTION AND ALTERNATIVE

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

The proposed action (the preferred alternative) for the Minuteman II (MM II) missile system at Whiteman Air Force Base (AFB) and alternatives evaluated in this document were derived in part from the procedures and activities planned for, and occurring at, the MM II system at Ellsworth AFB. Some alternatives were developed specifically for the potential action at Whiteman AFB. All the actions contemplated, except for continued operations (no action), respond to the need for deactivation described in chapter 1. This document analyzes the environmental effect and potential impact of the proposed action and a number of alternatives, as well as the mitigation of potential impacts, all of which are described in the following subsections.

2.2 PROPOSED ACTION: DEACTIVATION OF MM II SYSTEM AT WHITEMAN AFB

The Air Force proposes to deactivate the MM II system at Whiteman AFB. This system includes 150 launch facilities (LFs)—one missile per LF—and 15 launch control facilities (LCFs) located in a deployment area around the missile support base (MSB). The 351st Missile Wing (MW) is made up of the 508th, 509th, and 510th Missile Squadrons (MSs) (figure 2.2-1). Each MS includes 5 flights, each composed of 10 LFs and 1 LCF. All LFs in a squadron can be controlled by any LCF within the squadron. The 10 LFs within a flight are directly connected to an LCF through a hardened intersite cable system. Each LCF or LF is identified by a letter defining its associated flight (A through O) and a number (number 1 designating an LCF and numbers 2 through 11 designating LFs). Deactivation under the proposed action alternative would proceed from the 510 MS, to the 508 MS, and finally to the 509 MS over an approximately 3-year period beginning in November 1992. However, personnel from the 351 MW have the option of changing the order of squadron deactivation after coordination with HQ ACC/DRN and HQ ACC/LGB. Over the entire program, approximately three to five LFs would be deactivated per month. The following subsections describe the details of the deactivation processes at the MSB facilities, LFs, LCFs, and other facilities. Locations of AFBs involved in the deactivation process, either directly or indirectly, are shown in figure 2.2-2.

2.2.1 MSB Facilities

A number of MSB facilities support the 351 MW mission and would be involved in the proposed action. Figure 2.2.1-1 shows the location of these facilities. Training facilities are located at the MSB to help maintain proficient operations and maintenance crews. A missile maintenance training area (T-12)—a model LF outfitted with a full-scale launcher and underground access—allows the maintenance crews to practice on base, rather than driving approximately one-half hour to the nearest launcher. In addition, training launch control centers for combat crew practice are located within Building 48.

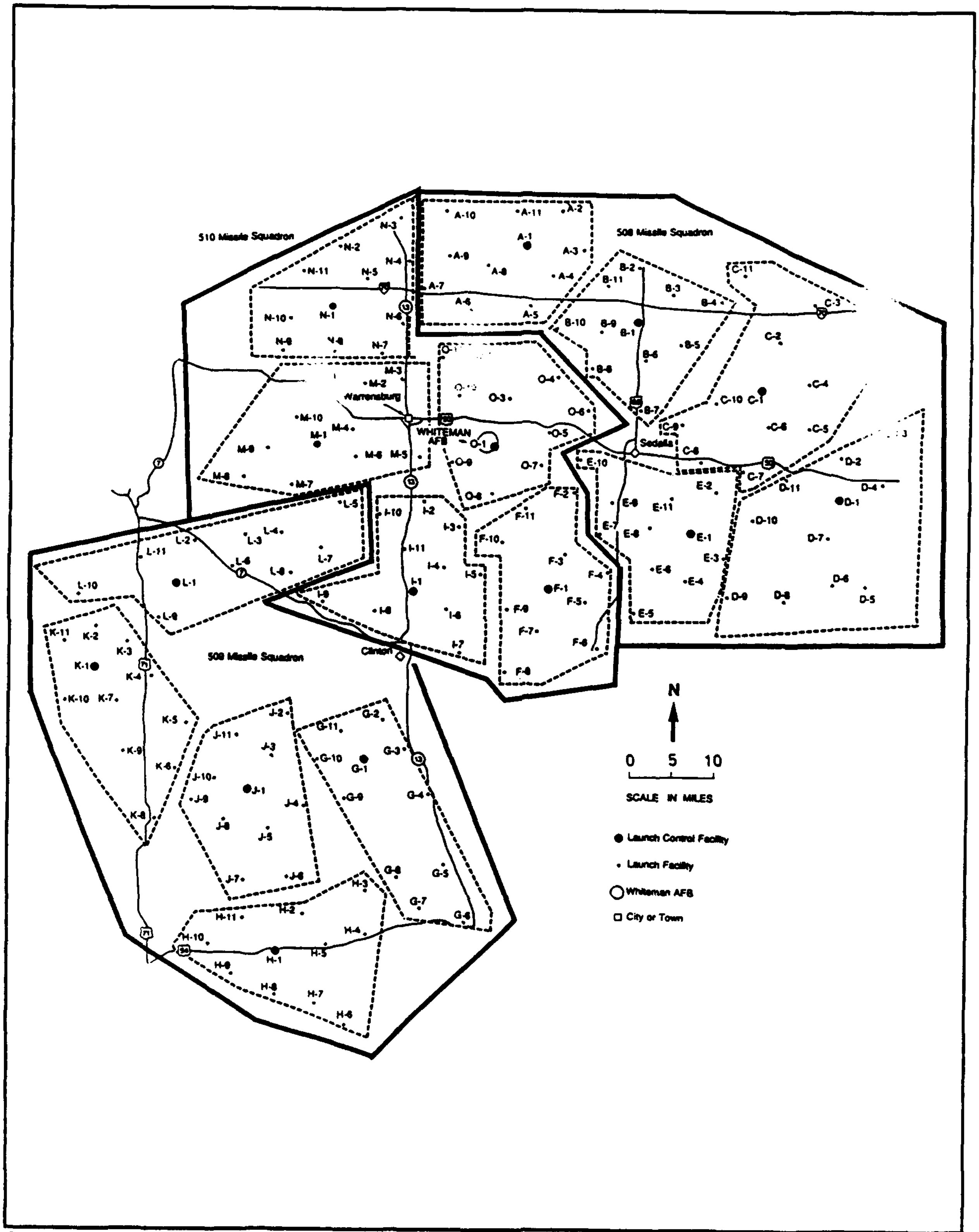

Figure 2.2-1 Location of the Minuteman II Intercontinental Ballistic Missile System and Missile Squadrons Overseen by Whiteman AFB

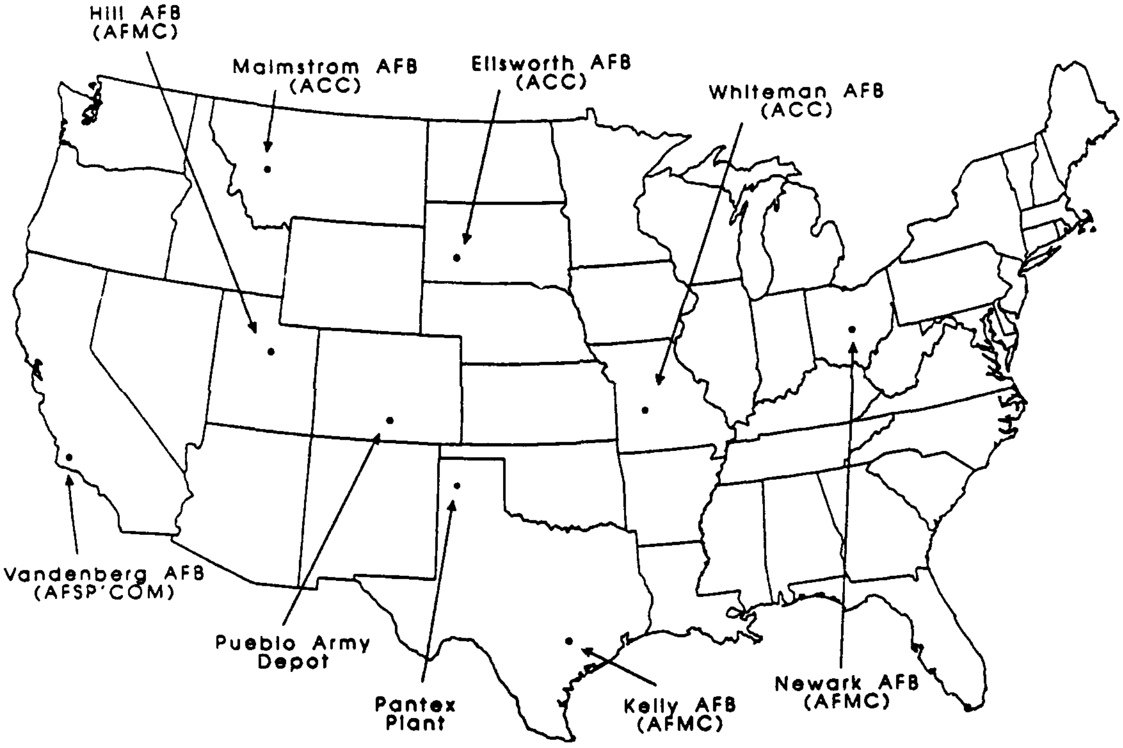

Figure 2.2-2 Location of Facilities Directly and Indirectly Involved in the Minuteman II Deactivation at Whiteman AFB

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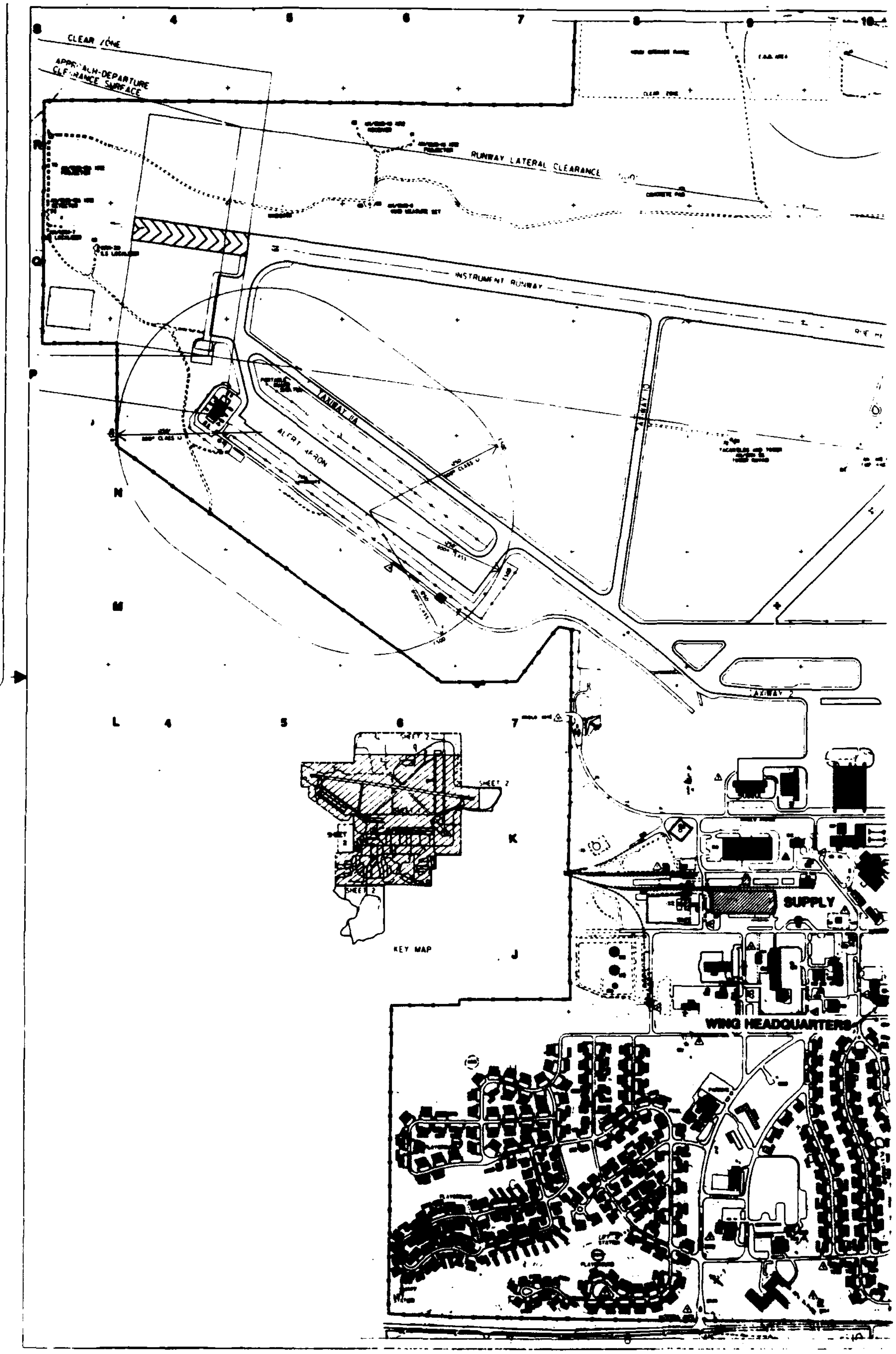
(1)


CLEAR ZONE
APPROACH-DEPARTURE CLEARANCE SURFACE
RUNWAY LATERAL CLEARANCE
INSTRUMENT RUNWAY
TAXIWAY
ALERT APRON
TAXIWAY 2
SHEET 2
KEY MAP
SUPPLY
WING HEADQUARTERS

(2)

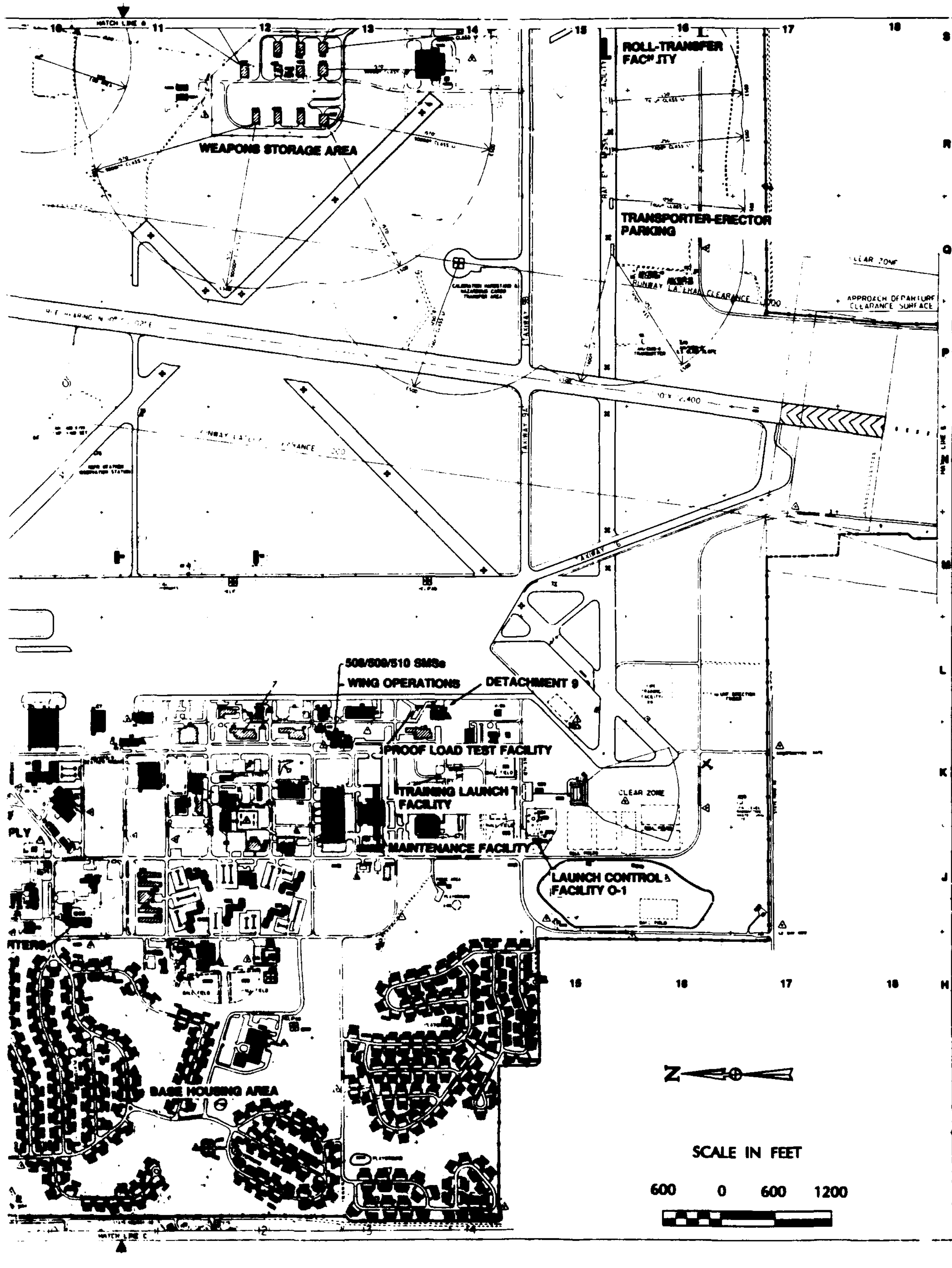


Figure 2.2.1-1 Minuteman II System Facilities at Missile Support Base

Special vehicles used to transport large parts of the missile are parked outside Building 709 and Building 3300 at the MSB. At Whiteman AFB, the reentry vehicle (RV) and missile guidance set (MGS) are transported in an RV/G&C (reentry vehicle guidance and control) van. A transporter-erector (TE) is used to transport the three connected rocket stages, or booster, of the missile. Loaded TEs returning to the MSB arrive at the Missile Handling Facility, also referred to as the Roll-Transfer Facility (Building 3300). Within this building, the booster is placed in a storage container for shipment by plane, rail, or truck to Hill AFB, Utah. A missile transporter (MT) can be used to store the missile for transport by rail or road, and a shipping and storage container for ballistic missiles (SSCBM) is used for air or rail transport. The roll-transfer process is reversed for missiles arriving from Hill AFB. After removing the RV and MGS from an LF, the maintenance personnel with the RV/G&C van first unload the RV for storage at the weapons storage area (WSA) then unload the MGS at Building 709 for vault storage. The RV is stored at the WSA until it is shipped to another Air Combat Command (ACC) base (transfer), Air Force Materiel Command (AFMC) facility (refurbishment), or Department of Energy (DOE) facility (retirement). The MGS may be transported to AFMC facilities for maintenance (Hill AFB or Newark AFB, Ohio).

Building 709 (maintenance complex) houses work areas, components of the missile system (including the MGSs, ethylene glycol coolant, sodium chromate coolant, etc.), and offices for the operations and maintenance personnel of the 351 MW. Building 69 is a proof-load test facility that contains hydraulic equipment for hoisting devices. After a TE emplaces a booster at an LF, it must return to the test facility to properly rewind the cables used to lower the booster. At this facility, a pit with hydraulic systems is used to test hoist cranes.

Detachment 9, 37th Air Rescue Squadron (Det 9, 37 ARS) supports the 351 MW using 5 HH-1H "Huey" helicopters through airborne surveillance of missile convoys and rapid transfer of critical personnel and missile system components to the deployment area. Building 91 includes maintenance bays for the helicopters, and offices.

The final disposition of all facilities at the MSB in the deactivation process has not been determined. However, it is likely that Building 709 would be used for future offices and facilities for the B-2 Bomb Wing (BW) to be based at Whiteman AFB. Section 3.1.3 discusses the deployment of the B-2 bomber and other proposed missions and facility uses at Whiteman AFB. If the proposed action occurs, Oscar-1, the only on-base intercontinental ballistic missile (ICBM) launch control facility at a Missile Wing in the United States, and the LF trainer (T-12) are planned to be maintained as museums (the launch capability of Oscar-1 would be deactivated by removing all MM II missiles from the deployment area). The facilities used by Detachment 9 could be reused by the T-38 trainer mission that would arrive with the B-2 bomb wing. Currently, there are no specific plans for reusing the vehicles used by the 351 MW. Some vehicles may be used at other AFBs, others could be sold through the Defense Reutilization and Marketing Office (DRMO), and some may be scavenged for parts. The facilities, with the exception of office space within Building 709, would not likely be modified until the deactivation of the LFs and LCFs is complete.

2.2.2 Missiles

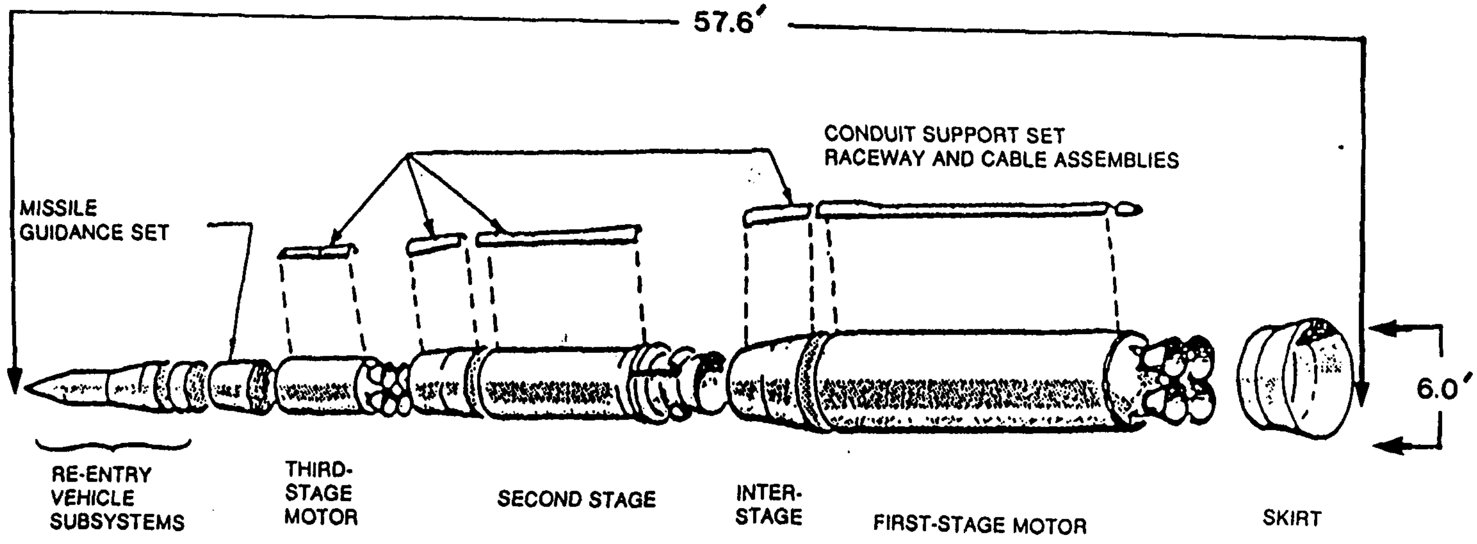
The MM II is a solid-fuel missile with three rocket motor stages and one warhead. The missile is 57.6 feet long, 6 feet in diameter, and weighs approximately 73,000 pounds. The three rocket motors make up the lower part (booster) of the missile, and the MGS and RV rest on top of the booster (figure 2.2.2-1). When emplaced, the top of the missile is several feet below the launcher door.

Under the proposed action, the missiles would be removed from the LFs under the same procedures and at approximately the same rate at which they were being removed under recent maintenance and modernization operations. The removal and transport of the missiles from the LFs introduces no new procedures or techniques; the same methods applicable to current operations would be applied to the proposed action. The procedures are proven and would involve experienced personnel. Under a recent program to replace the second stage of the booster system, four to eight boosters were transported each month from the deployment area at Whiteman AFB to the MSB and then to Hill AFB. Whiteman AFB is performing only failure-related movements of rocket motors at present; about one missile is being replaced each month. Under the proposed action, about three to five missiles would be removed each month. Weather, equipment breakdown, and holidays would cause the missile removal and transport rate to vary.

Under existing operations, approximately 1 day is required to remove the RV and MGS of a missile. Once the RV and MGS are loaded into the RV/G&C van and properly contained for shipment, the vehicle leaves the site. The vehicle is escorted by security forces to counter potential threats the vehicle might encounter while enroute to the MSB. Any maintenance vans carrying material and personnel that were involved in removing the RV and MGS are not part of the convoy. It is likely that only one van per site would be used during RV and MGS removal.

Some time after the RV and MGS systems are removed, a TE is driven to the LF accompanied by a maintenance vehicle and maintenance personnel. Once the rocket motors are removed and stored in the TE, the TE usually travels alone back to the MSB. Within 24 hours before the use of a TE, the exact route of the movement is driven to ensure that there are no roadway obstructions. During inclement winter weather, a sander and a plow escort the TE. If missiles must be moved during adverse winter weather, no change in procedures are anticipated to maintain the deactivation schedule. As part of the proposed action, an average of one booster per week would be transported from Whiteman AFB to Hill AFB. The mode of transportation would primarily be by air (C-141), with some rail and road transport.

The proposed method for handling the missiles during the beginning phase of deactivation entails pulling all the RVs and MGSs in a squadron before removing any boosters. Under this method, 5 to 6 weeks would be necessary to remove all RVs and MGSs for the 50 missiles of a missile squadron. Approximately two RVs and MGSs would be removed each day. After removing the RV and MGS systems, approximately one booster would be removed each week.



Source: US Air Force. 1988d.

Figure 2.2.2-1 The Minuteman II Solid Fuel Missile

Under the proposed action, the existing handling and transportation procedures for each MM II RV and MGS would be followed: the RVs are scheduled for retirement and would be shipped (by DOE safe secure transport (SST) or Air Force airlift) to Pantex, near Amarillo, TX, or other classified DOE holding facilities; the MGSs would be inspected at Whiteman AFB. Some of the MGSs would then be retired and shipped to Newark AFB for dismantlement. The other MGSs would be sent to Hill AFB for storage as replacement units or to Pueblo Army Depot, CO, for reuse in the Reentry System Launch Program. Transport of the MGSs off-base would be performed by air shipments, although ground shipments could be conducted. A typical shipment would consist of 7 to 9 units per flight; approximately 20 shipments would be required to remove the MGSs from Whiteman AFB.

Except for the nuclear warheads, which ACC owns until they are retired (at which time DOE assumes ownership), the MM II missiles are the property of the AFMC; ACC is merely the custodian. ACC is responsible for depot level maintenance, engineering, modifications, hardness assurance, engineering support, technical surveillance, and guidance to base units in support of ICBMs. When the rocket motors and other missile components are loaded for transport from the MSB, and an AFMC representative or an AFMC contractor signs for the missile components, they become the responsibility of AFMC; a similar relationship exists with ACC and DOE for warhead retirement. The rocket motors and other missile components are transported by aircraft, train, or truck.

An environmental assessment (EA) was prepared by AFMC (formerly AFLC) to evaluate the potential environmental impacts of transportation and storage of the rocket motors from the MM II system deactivation (USAF OO-ALC, 1991). The impacts of reentry vehicle retirement and transportation of radionuclides have also been assessed (DOE, 1977 and 1983; U.S. Nuclear Regulatory Commission, 1977 and 1987). As previously discussed in section 1.1, these studies are incorporated by reference (per 40 CFR 1502.21) into this analysis. Further details of potential environmental impacts involving rocket motor and reentry vehicle handling and transportation are presented in section 4.7 and appendix E. Chapter 5 of this Environmental Impact Statement (EIS) discusses further details about the potential environmental impacts of rocket motor handling, movement, and storage, and the cumulative impacts of the Minuteman II activities at Whiteman, Ellsworth, Malmstrom, and Hill AFBs.

2.2.3 Launch Facilities

The deactivation process is planned to occur at more than one flight (10 LFs) at a time. Deactivations of several LFs in one or more flights would occur simultaneously. Once deactivation has been completed at a site, the deactivation process would begin at another LF until all flights within an MS are deactivated. The deactivation process would then begin at the next MS. Figure 2.2.3-1 shows the flow of tasks for this deactivation process. A launch facility consists of a launcher and an associated launch facility support building (LFSB) within an average site area of 1.8 acres enclosed by a security fence (figure 2.2.3-2). The LF security fence would remain in place throughout the dismantlement. The interior of the launcher is approximately 80 feet deep and 12

feet in diameter. A launcher closure door weighing approximately 90 tons caps the launcher and can be opened for maintenance activities or launching. The headworks of the LF is the widest part of the launcher, as shown in figure 2.2.3-3; it is approximately 25 feet wide and 33 feet deep. The reinforced-concrete wall of the headworks is 27 inches thick.

The deactivation process consists of three main phases: site deactivation, caretaker status, and dismantlement. Site deactivation begins with removal of the RV and MGS. After the missile is removed, approximately 10 to 14 working days would be required to remove salvageable items from the LF. Ordnance would be removed from the LF for transport to the MSB munitions area. Classified items would be recovered by the Air Force. After the classified material has been removed from the LF, Air Force personnel would drain fluids (ethylene glycol, oil, and sodium chromate solution) from the coolant and hydraulic systems. Air Force personnel would remove the electrical filters suspected of containing polychlorinated biphenyls (PCBs) (in the power panel on the first level of the launcher equipment room (LER)), and the mercury switches in the waste water system (sump pump) within the LF. The electrical filters suspected of containing PCBs and the mercury switches would be transported back to the base for disposition. Those filters that do not contain PCBs would be put into the base supply system for use by the base and other bases. The existing cooling system circulates sodium chromate solution from a 7-gallon tank. Air Force personnel would remove the existing cooling system (some of these systems are save-list items that would be reused). The Air Force also would remove and transport the 12 weapons system power supply batteries (lead-acid) from the launcher to a designated holding area at the MSB to await reuse or other disposition. Air Force security teams would perform periodic security checks of each LF during site deactivation until the site is placed in caretaker status.

After the removal of classified and critical items, the launcher closure door would remain closed while the site is in caretaker status (a period of time after the Air Force finishes with its removal actions and before the dismantlement is turned over to a contractor). The contractor begins the site dismantlement phase with salvage and/or demolition activities. The launcher closure door is opened and remains open throughout this phase of the dismantlement process (the door will later be demolished along with the headworks and become part of the rubble fill (demolition waste) for the launch tube). The rubble fill would consist of the demolition waste at the site and clean fill dirt that has been obtained from a borrow pit area.

The Launch Facility Support Building (LFSB) contains a number of items that would be removed as part of the proposed action: the environmental control system (ECS) for the LF (ethylene glycol coolant/freon refrigerant); the diesel electric unit (DEU); the lubricant oil tank, diesel day tank (312 gallons), and associated piping; and the four small lead-acid batteries used for emergency diesel startup.

Ethylene glycol is cooled in the ECS by freon contained in a separate unit and is circulated through piping from the LFSB to the launcher. This closed-loop system provides overall cooling for the racks of equipment and serves as a general dehumidifier

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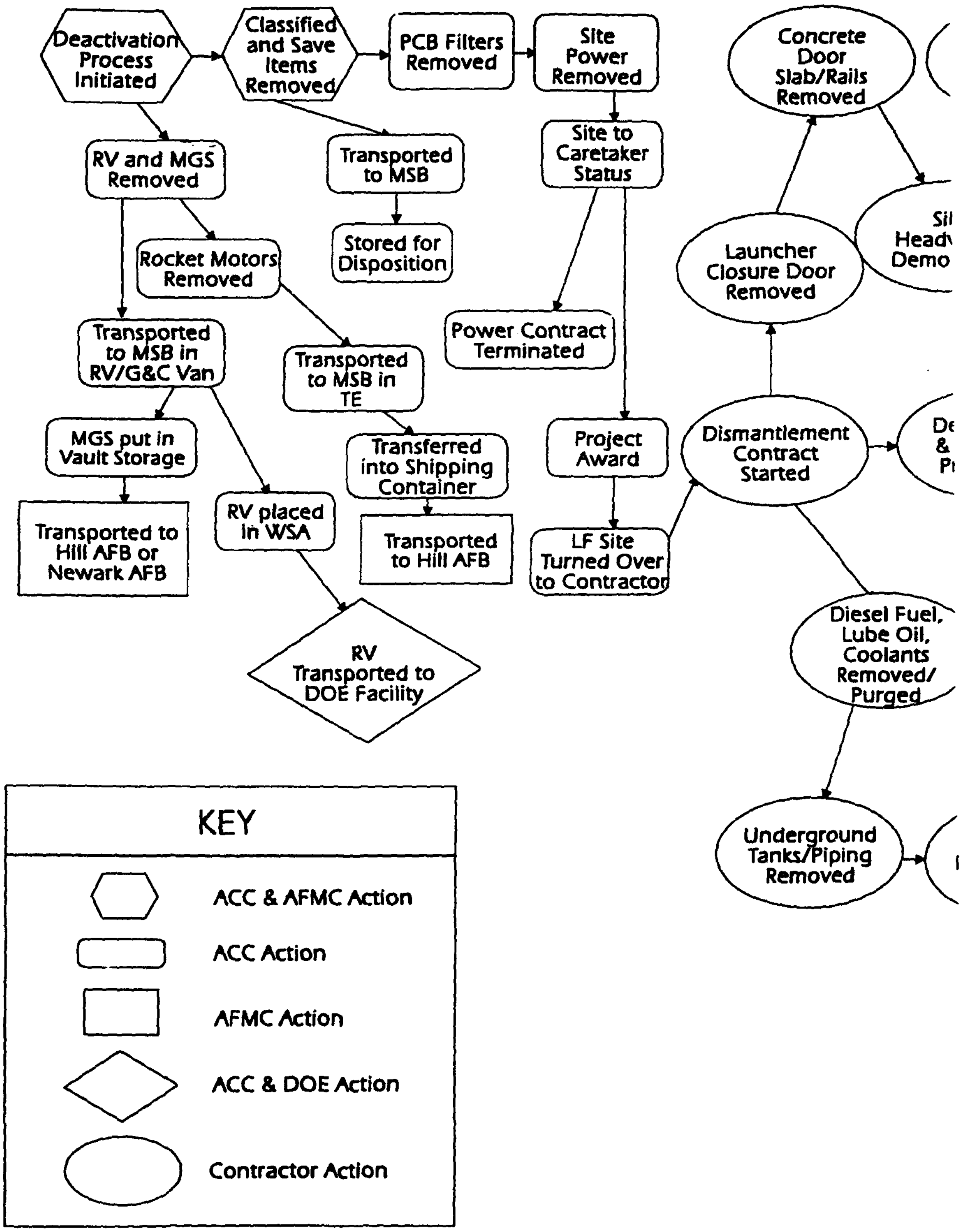

Deactivation Process Initiated
Classified and Save Items Removed
PCB Filters Removed
Site Power Removed
Concrete Door Slab/Rails Removed
RV and MGS Removed
Transported to MSB
Site to Caretaker Status
Stored for Disposition
Rocket Motors Removed
Launcher Closure Door Removed
Power Contract Terminated
Transported to MSB in RV/G&C Van
Transported to MSB in TE
MGS put in Vault Storage
Transferred into Shipping Container
Project Award
Dismantlement Contract Started
Transported to Hill AFB or Newark AFB
RV placed in WSA
Transported to Hill AFB
LF Site Turned Over to Contractor
Diesel Fuel, Lube Oil, Coolants Removed/ Purged
RV Transported to DOE Facility
Underground Tanks/Piping Removed
KEY
ACC & AFMC Action
ACC Action
AFMC Action
ACC & DOE Action
Contractor Action

2

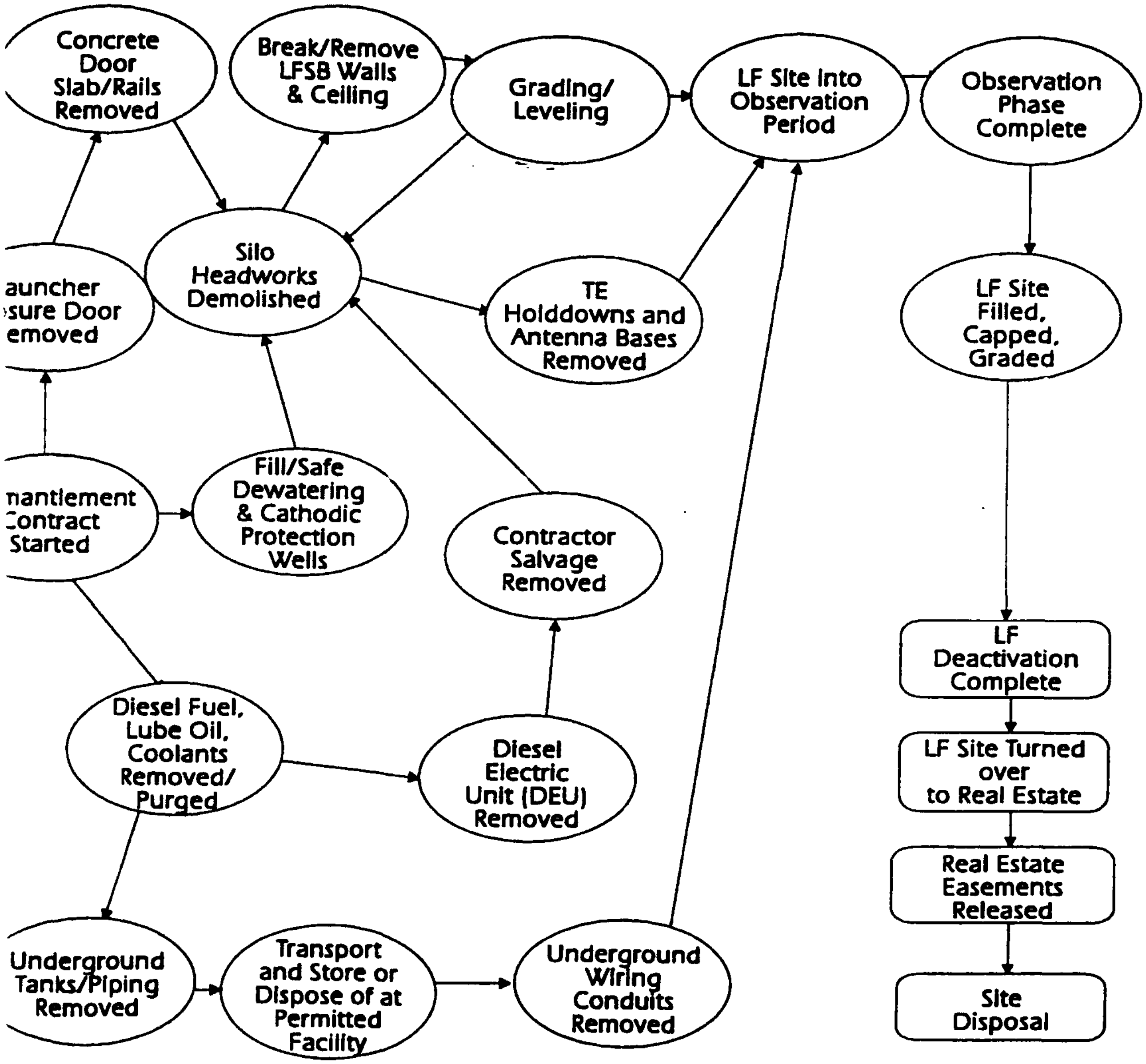
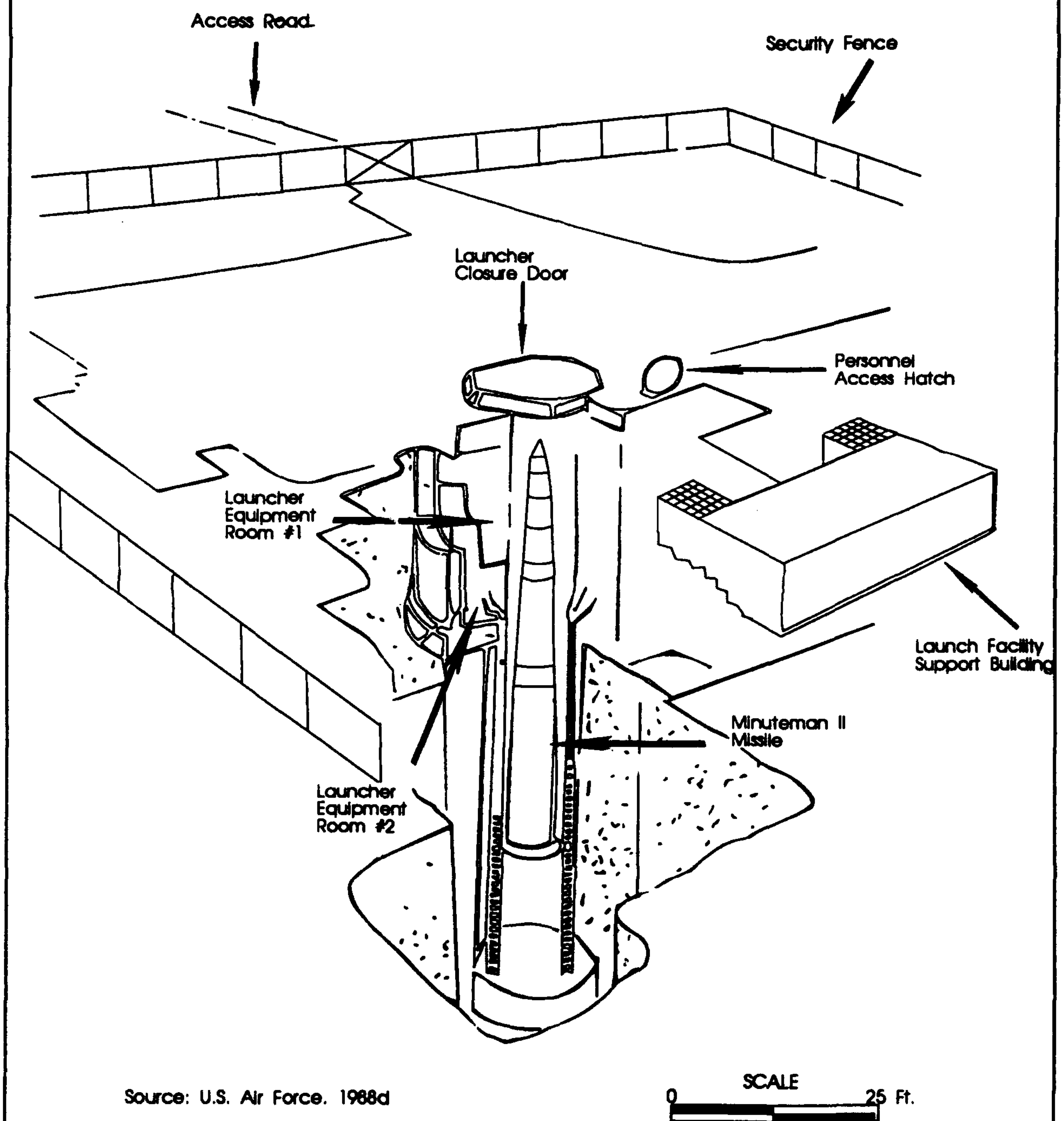


Figure 2.2.3-1 Flow of Deactivation Process for a Launch Facility



Source: U.S. Air Force. 1988d

Figure 2.2.3-2 Launch Facility and Grounds

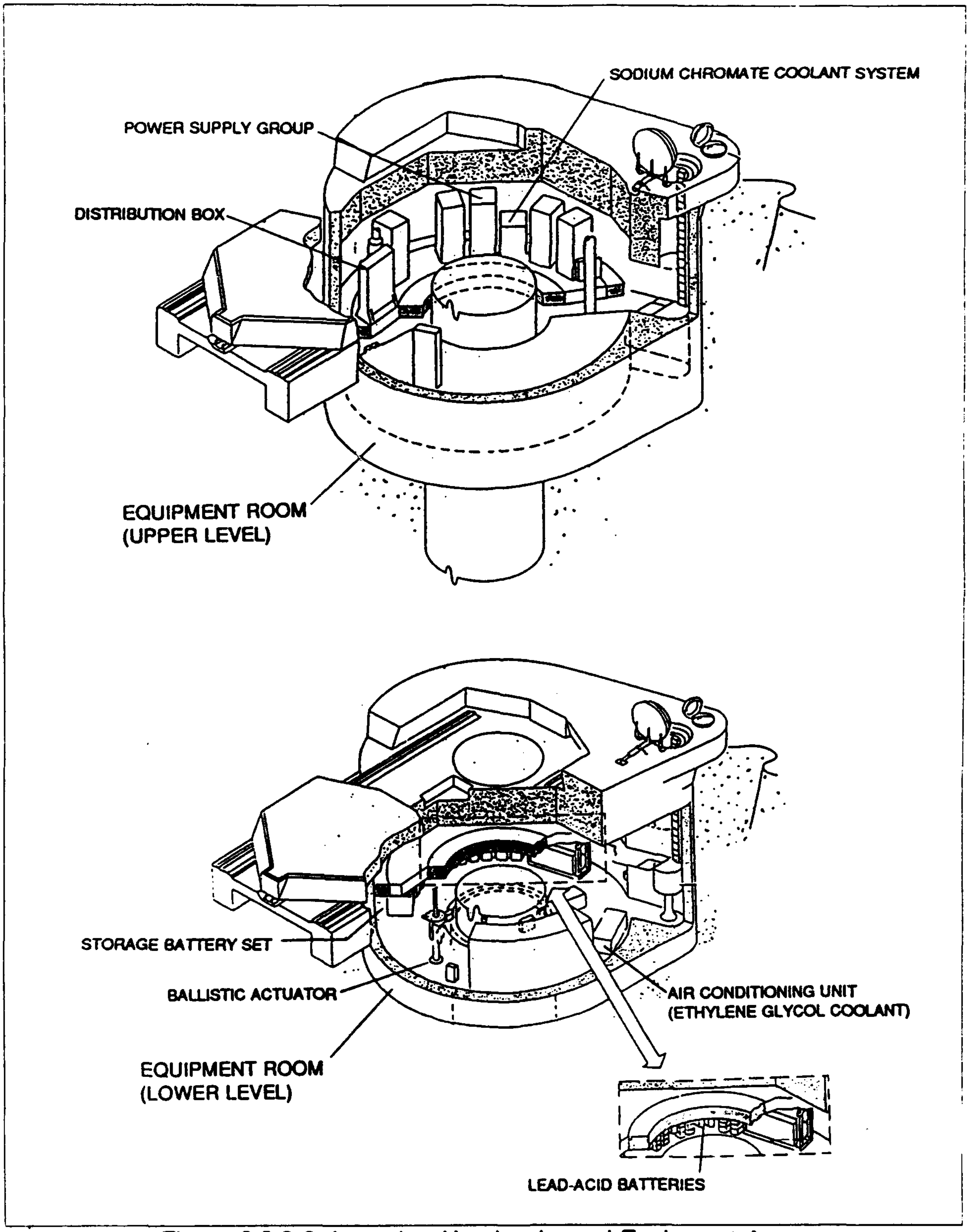


Figure 2.2.3-3 Launcher Headworks and Equipment Areas

for the launcher. The ethylene glycol lines would be drained and piping would be left in place. However, the freon is contained in the refrigeration unit and is physically isolated from the ethylene glycol (a closed-loop system). The entire brine chiller unit (refrigeration unit) would be removed with a crane and the unit transported on a flatbed truck to the MSB. The Air Force would remove a limited number of these units, and the contractor would remove the rest.

The Air Force would disconnect the DEU. The contractor would remove and deliver selected diesels to the MSB for the Air Force to reuse. The contractor would remove and salvage remaining diesels and other bid-cost items, including the diesel fuel in the underground storage tank (UST) adjacent to the LFSB. The contractor would also drain, remove, and dispose of the diesel fuel day tank and the lubricant oil tank inside the LFSB. The contractor would remove the four small, DEU lead-acid batteries from the LFSB and retain them for reuse or other disposition. After removal of the equipment, the roof and walls of the LFSB would be broken up as rubble to approximately 4 feet below grade and used as fill.

The LF diesel fuel tank (a 14,500-gallon UST, 8 feet in diameter and 42.5 feet long) and piping in and between the launcher and LFSB would be drained, excavated, and removed by the contractor (figure 2.2.3-4). The top of this tank is approximately 4 feet below the ground surface.

Physical features separate from the launcher and LFSB would be dismantled by the contractor and either removed from the LF, or used as rubble. The following items would be removed: the IMPSS (improved Minuteman physical security system) antenna used for detecting intruders (this item may be reused); area lighting poles; concrete markers, pull boxes, antenna bases, TE landing gear pads, and similar concrete features; and launcher closure door, rail slab, and wing walls. The concrete appurtenances would be removed to approximately 4 feet below grade, and the rail slab and wing walls would be removed to a depth consistent with dismantlement of the launcher headworks. Cathodic protection wells at all sites would be sealed and capped in accordance with all applicable regulations.

Piezometric wells are located at sites O-3 and N-11; the well at O-3 is 150 feet deep, and the depth of the well at N-11 is unknown. These wells were drilled and installed with a piezometric sensor in a crush-proof container; then the well was filled in around the sensor and capped. The ¾-inch conduit that extends above each well will be cut and capped 3 feet below grade to remove them as a surface obstruction. These capped well sites comply with State closure laws.

Cathodic protection systems to protect USTs from corrosion are located at every LF and LCF. These systems contain an anode and a carbon product known as cokebreeze. The systems are not regulated because the State of Missouri does not consider the anodes and carbon as pollutants (Netzler, 1992).

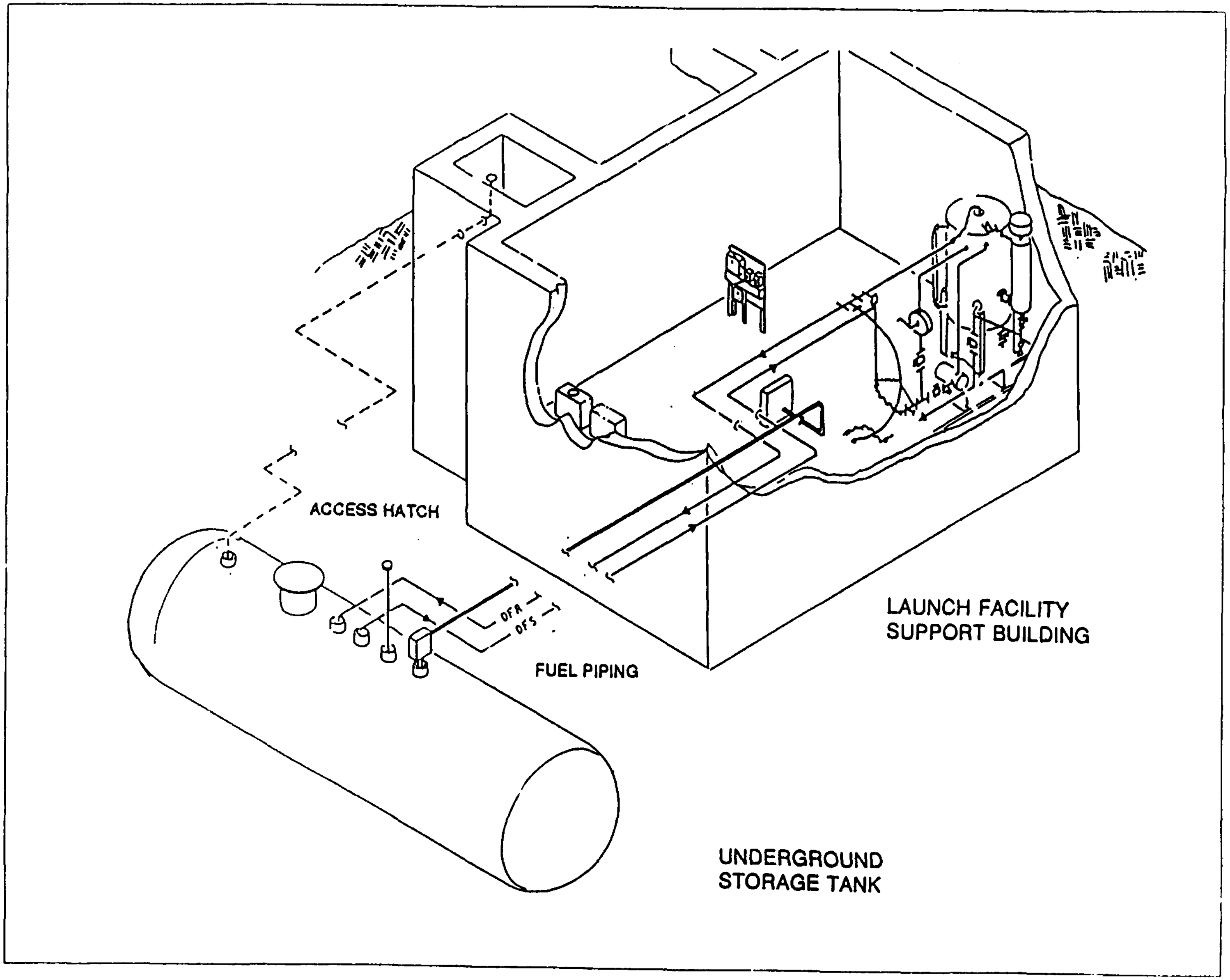


Figure 2.2.3.4 Launch Facility Support Building with Associated Underground Storage Tank

As discussed in section 1.1, the proposed action would be performed to satisfy budget and program incentives, but the action is also planned to satisfy the limitations on and reductions of strategic arms as part of the Strategic Arms Reduction Treaty (START), being evaluated for ratification by Congress. To meet expectations for the Treaty, the launcher would be destroyed and an observation/verification period would be scheduled.

The next phase of the deactivation process is launcher dismantlement. The proposed technique for destroying the LF includes explosive demolition of the headworks to the depth of the existing Launcher Equipment Room (LER) #1 floor (approximately 21 feet). Another acceptable method would be to mechanically demolish the LF using jackhammers or a large metal sphere dropped from a crane to a depth of approximately 28 feet. These depths comply with START protocols that require explosive demolition to at least 6 meters (19.7 feet) or mechanical demolition to at least 8 meters (26.2 feet).

For explosive demolition, everything above the floor of LER #1, including the launcher closure door, would be removed for salvage or become rubble. Holes would be drilled in the concrete of the headworks for emplacement of explosives. To limit environmental impacts, the Air Force has produced specifications for explosive demolition that prescribe maximum noise levels, ground attenuation, and debris criteria. The criteria have been formulated based on Corps of Engineers (COE) guidelines described in the discussion of impacts to air quality (section 4.2) and geological resources (section 4.3). A plan indicating on-site storage and demolition activities would be submitted through USAF command channels to the Department of Defense Explosives Safety Board for approval. The purpose of this plan is to verify compliance with DoD and USAF explosives safety criteria.

Approximately 300 to 500 pounds of explosives would be needed to destroy the headworks (COE, 1991; Gracon, 1991; ICBMFES/DEB, 1991). Explosives used in the demolition of Titan II sites and likely to be used under the proposed action include: ANFO (ammonium nitrate with fuel oil), TOVEX® (ammonium nitrate slurry with monomethylamine thickener), and TNT (trinitrotoluene) (ICBMFES/DEB, 1990). The amount of explosive used depends on the design and the amount of material to be demolished. The Air Force will have the dismantlement contractor use the minimum amount of explosives necessary to cause an implosion of the concrete and steel into the launch tube. The demolition of each LF will be designed to preclude the ejection of large pieces of debris outward from the launch tube. Smaller charges could be used to destroy the launcher door.

The Air Force estimates that the amount of rubble produced from destroying the upper 25 feet of the headworks would be sufficient to fill the launch tube to the elevation of the former floor of LER #1. Figure 2.2.3-5 shows the launch tube filled with rubble and the headworks demolished.

The next phase of the process, assuming ratification and implementation of START, is an observation/verification period. A 90-day verification period would follow

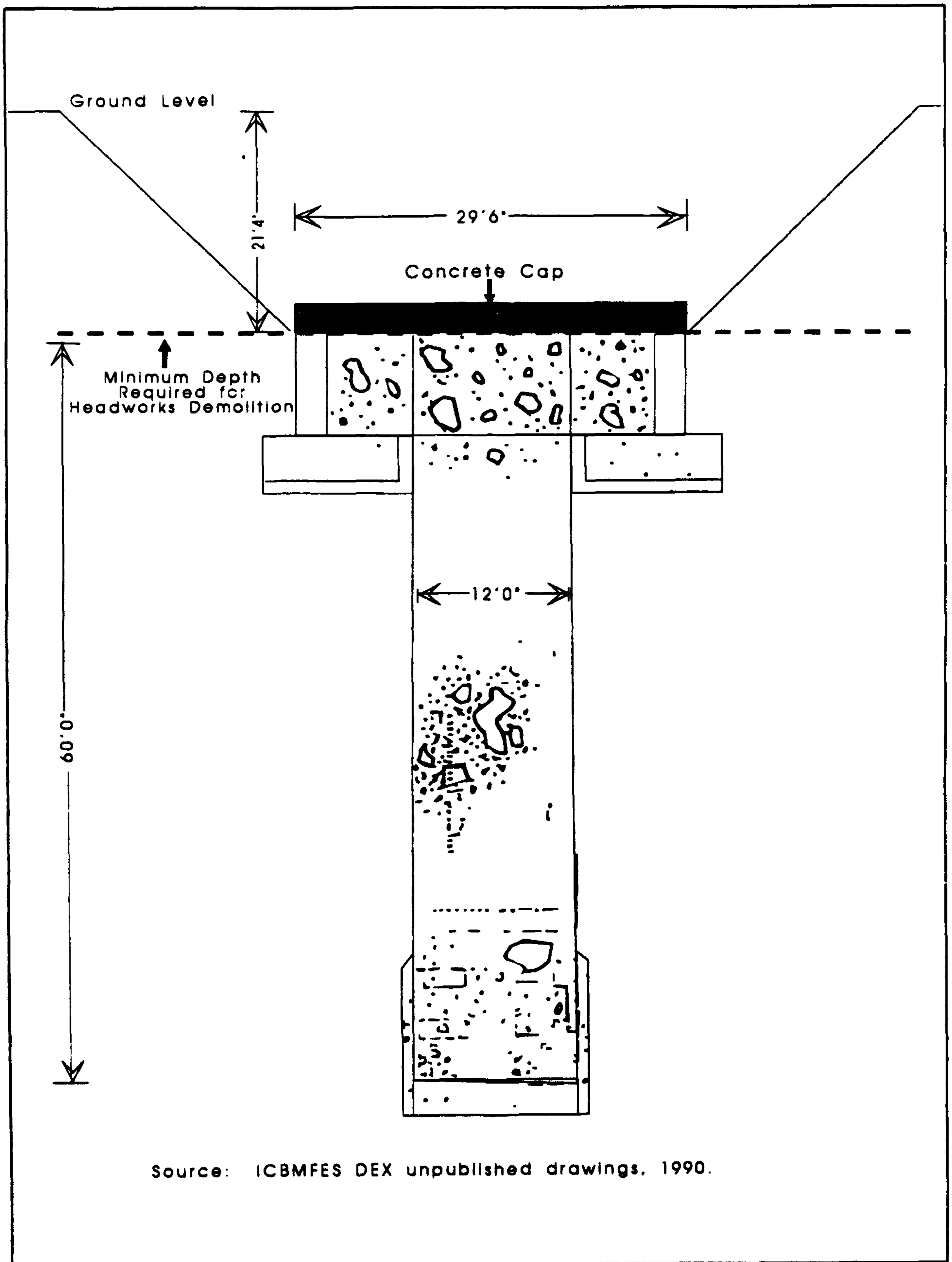


Figure 2.2.3-5 Launch Tube Filled With Rubble

demolition of the headworks. The Soviet verification process would likely occur through satellite reconnaissance, but the Commonwealth of Soviet Republics, formerly the Union of Soviet Socialist Republics (U.S.S.R.), would also have the authority to conduct onsite inspections.

After the verification period, a contractor would place a 2-foot-thick, 29 foot 6-inch diameter concrete cap, reinforced with steel, over the tube at an approximate 20-foot depth. The remaining excavations would be filled with rubble, backfilled, compacted, and surfaced with approximately 6 to 8 inches of gravel to match the existing graveled surface.

Items outside the LF security fence but part of the facility, such as the electrical service pole and cathodic protection system control, would be removed during site deactivation. A hardened intersite cable system (HICS) connects each LF with an LCF. The cable system consists of approximately 1,777 miles of cable. Approximately 10,510 gates provide access to the cable. Marker posts sited within the surrounding land define the path of the cable. Under the proposed action, the HICS would be abandoned in place and the gates and marker posts would be removed at the landowner's discretion. If the gates were removed, the fence would be replaced.

Power companies own the transformer pole and service connections to the LF; removal of the poles is their responsibility. Azimuth markers would be removed only at the landowners' request. Removal would generally be accomplished by trenching and burial in place. However, if the landowners request physical removal of the markers from their property, the Air Force would excavate, lift, and remove the markers for use as launch tube fill. The permanent restrictive easements for explosive safety generally do not allow structures, especially occupied dwellings, to exist within a 1,200-foot radius. However, a memorandum (USAF, 1962) allowed for the possibility of exceptions to the restrictive easement criteria and could allow structures within 670 to 1,200 feet from the center of the missile site. For a planned explosive blast, the safety zone for occupied dwellings has been estimated at 2,800 feet.

The Air Force has no plans to retain any of the deactivated LF sites. The Air Force would dispose of the property by one of three methods after site deactivation. The first method is covered by 10 USC 9781 (Public Law 100-180, dated December 4, 1987) and is for those tracts surrounded by lands that are adjacent to such tracts and are owned in fee simple by one owner or by more than one owner jointly, in common, or by the entirety. For those sites, the Air Force or the Corps of Engineers could convey government interest to any person or persons who own surrounding lands for fair market value. The second method is under Title 40 USC and is for those tracts that are surrounded by more than one owner or one owner jointly, in common, or by the entirety and have an appraised value of $1,000 or less. Because these sites would not fall under special legislation, they would have to be reported to the Department of Housing and Urban Development (HUD) for potential use by the homeless and be processed according to laws and regulations. The Air Force would dispose of these sites through COE by competitive bid. The third method is through sale by the General Services

Administration (GSA). All remaining sites that could not be disposed of under the first two methods (i.e., the surrounding landowner(s) did not want to pay fair market value, or the COE had no response to competitive bids, or the fair market value exceeded $1,000) would be disposed of by the COE turning over the land to GSA. GSA would offer the land to other government agencies, and if no government agency were interested, the land would be sold through competitive bidding.

For demolition wastes that are left in place and covered, solid waste disposal area deed notices may be required pursuant to the Missouri Solid Waste Management Law and regulations promulgated from the Law. This information would be disclosed prior to the transfer of the government property.

Private/State owners of adjoining fee lands that take ownership of the lands may wish to use the fenced gravel maneuver area as convenient hardstands for farm vehicles or other machinery, or for other uses.

2.2.4 Launch Control Facilities

Two options are being reviewed for the order of the LCF deactivation. The first option is to begin LCF deactivation within a particular MS after all LFs in that squadron have been deactivated. The second option is to release LCFs for deactivation as soon as system security and control can be assured through the remaining LCFs. The Air Force needs to maintain effective communications between LFs, LCFs, and the MSB to sustain LF operational capability. The Air Force is now evaluating the interconnectivity of the system to support implementation of a preferred option for maintaining nuclear surety throughout the deactivation process. All LCFs would be deactivated, although Oscar-1 is planned for only partial deactivation for reuse as a museum.

For all LCF sites other than Oscar-1, the Air Force intends to leave the LCF site security fence and support buildings (living facility) intact (figure 2.2.4-1). The remaining facilities would each retain amenities such as heat, air-conditioning, and a water well (operating well systems are located only at B-1, C-1, D-1, E-1, F-1, and H-1). All sewer pipes at the LCFs will be disconnected and plugged. The contents of LCF sewage lagoons would be characterized and disposed of in accordance with all applicable regulations. To retain heat capabilities, the heat pump system in use would remain. Continuous electrical service could be maintained until disposal to prevent damage to the facility. With the exception of Oscar-1, land disposition would proceed the same as LF sites, as discussed in section 2.2.3. However, because the expected value of the former LCF living facilities would exceed $1,000, only the first and third methods would be applicable to disposition of LCF sites. A survey of the asbestos-containing materials should be conducted of the LCF sites before any real estate transactions.

The proposed actions at each LCF, excepting Oscar-1, are described in the following paragraphs (figure 2.2.4-2 illustrates the process flow); the LCF deactivations can occur concurrently or consecutively. The deactivation plans for Oscar-1 are presented at the end of section 2.2.4.

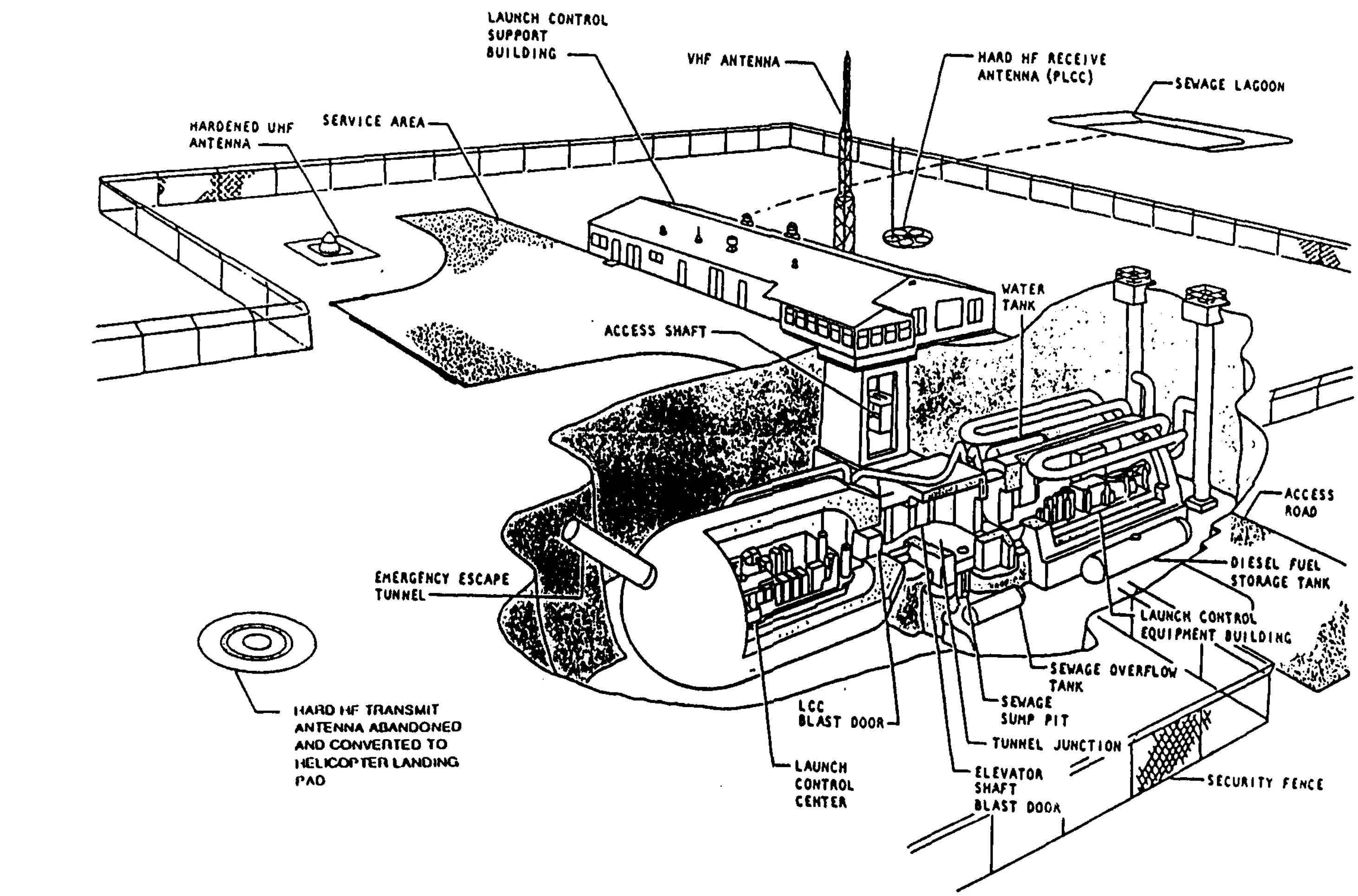
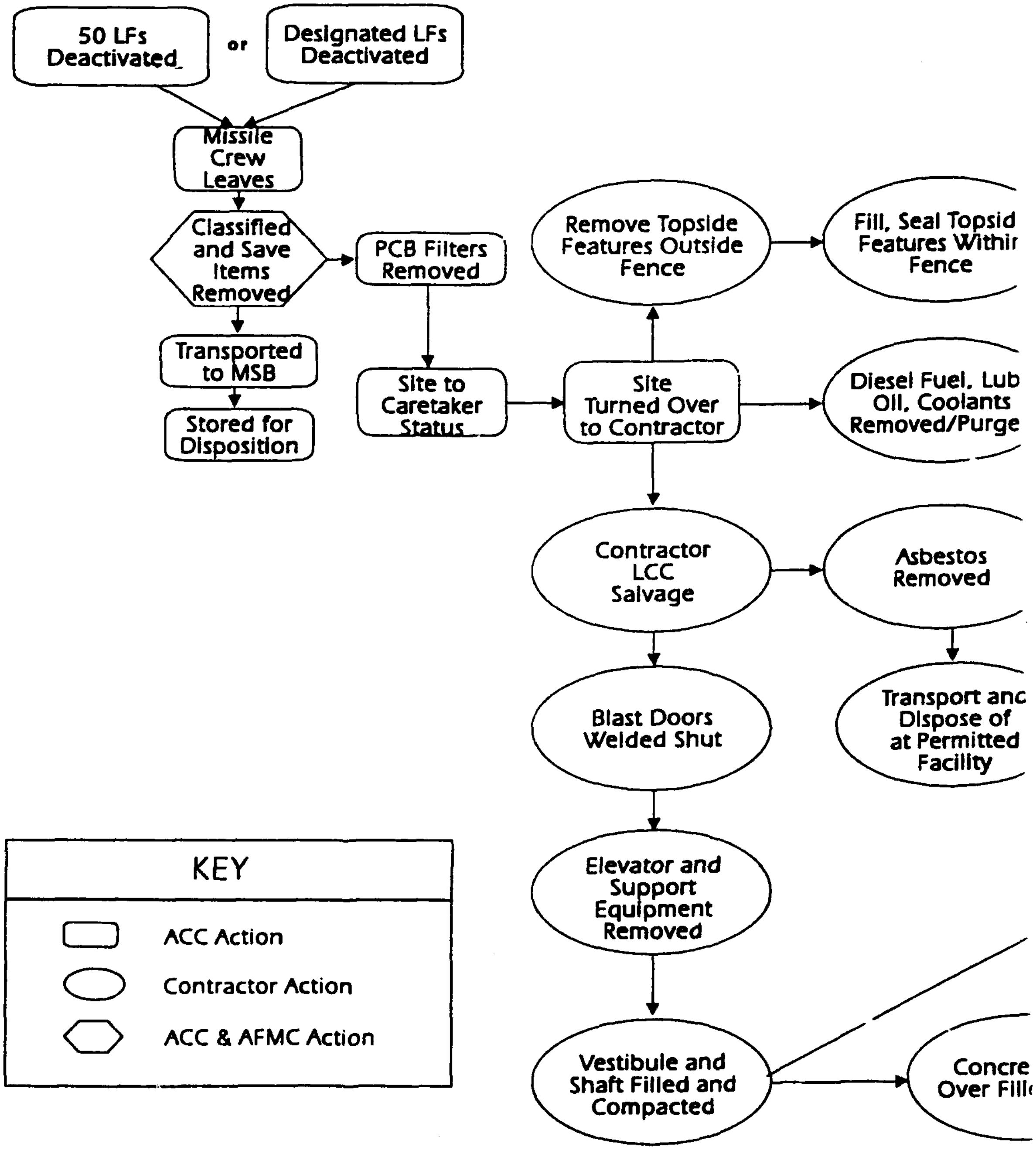


Figure 2.2.4-1 Launch Control Facility (LCF)

(1)



50 LFs Deactivated
or
Designated LFs Deactivated
Missile Crew Leaves
Classified and Save Items Removed
PCB Filters Removed
Transported to MSB
Stored for Disposition
Site to Caretaker Status
Site Turned Over to Contractor
Remove Topside Features Outside Fence
Fill, Seal Topsid Features Withir Fence
Diesel Fuel, Lub Oil, Coolants Removed/Purge
Contractor LCC Salvage
Asbestos Removed
Blast Doors Welded Shut
Transport anc Dispose of at Permitted Facility
Elevator and Support Equipment Removed
Vestibule and Shaft Filled and Compacted
Concre Over Fill
KEY
ACC Action
Contractor Action
ACC & AFMC Action

(2)

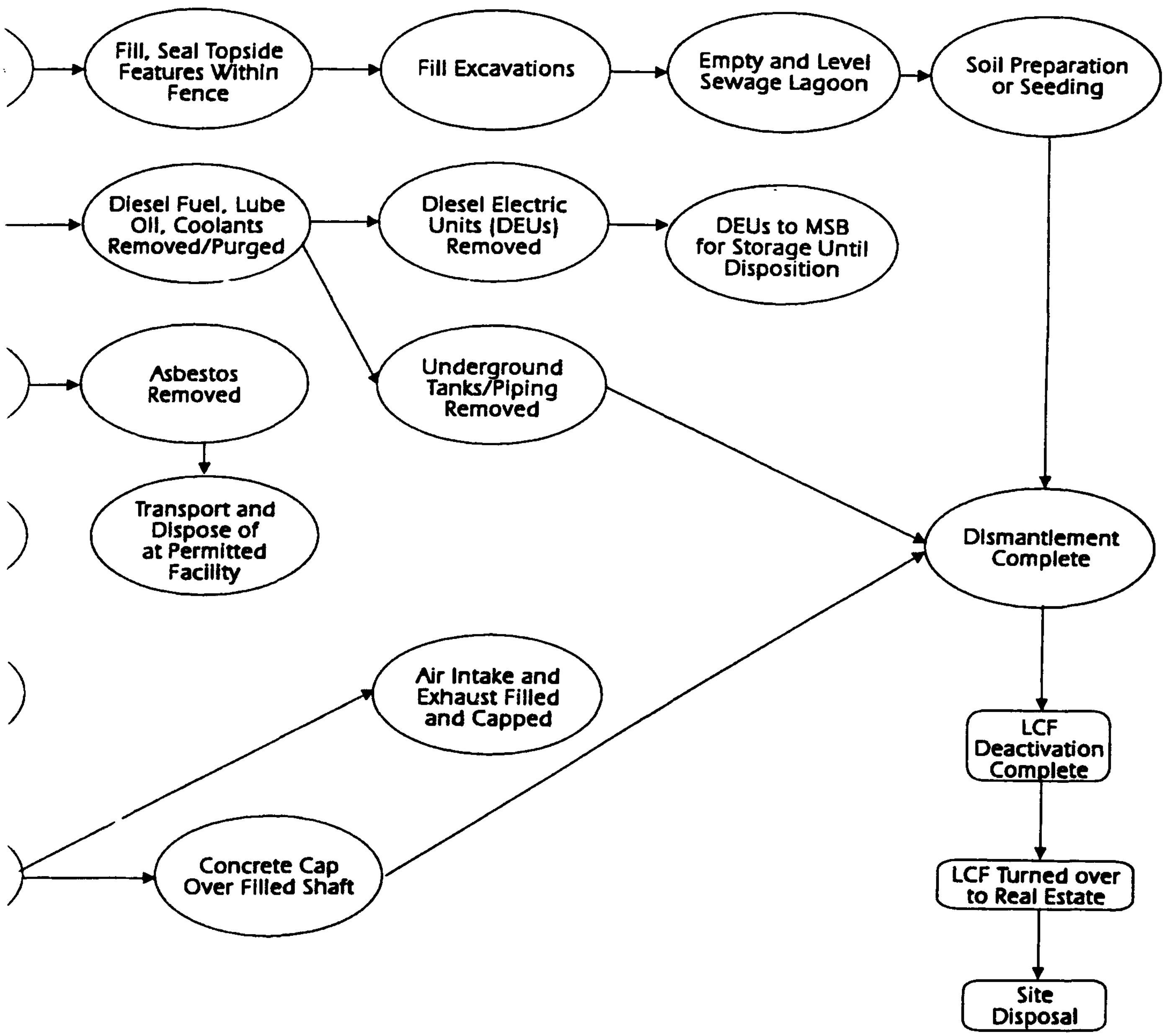


Figure 2.2.4-2 Flow of Deactivation Process for a Launch Control Facility

The Air Force would begin the LCF deactivation process by removing classified material and components from the Launch Control Center (LCC), located approximately 40 to 50 feet below ground level. Air Force Personnel would remove the lead-acid weapon system batteries would be removed from the LCC. The Air Force personnel would remove electrical filters suspected of containing PCBs from the LCC (including fluorescent light ballasts) and the Launch Control Equipment Building (LCEB). The LCEB is also underground and is separated from the LCC by a small corridor. Mercury that is contained within the switches in the waste water system (sump pump) and the air-conditioning unit, and the thermostat in the electric unit heater in the LCF would be removed by Air Force personnel. The batteries, suspected PCB-containing filters, mercury switches, and other potential contaminants would be removed from the LCF before the site would be placed in caretaker status. These materials would be transported back to the base for reuse or other disposition. Some of the filters that do not contain PCBs would be put into the base supply system to be used by Whiteman AFB and other bases.

The contractor would remove the asbestos-containing DEU exhaust system in the launch control facility support building (LCFSB)(the system in the LCEB may contain asbestos and would be treated as such unless proven otherwise) and dispose of the asbestos-containing waste in an approved landfill in accordance with all applicable regulations. The contractor would remove the two DEUs (both topside and underground) for salvage or deliver them to a designated holding area at the MSB. The contractor would remove the DEU's lead-acid batteries from the LCEB and the LCFSB and retain them for reuse or other disposition.

The contractor would be permitted to salvage items from the LCC and LCEB after Air Force removal operations are complete. After the contractor has completed the salvage operation, the blast door to the LCC and the tunnel junction blast door would be welded shut. The elevator, elevator structure, controls, motor, and all structural steel stairs, platforms, and supports would be removed from the elevator shaft. These items would be dismantled for removal through the service door without damage to the support building. An option would be to remove the motor and leave the rest of the material as rubble. The vestibule in front of the LCC door and the entire elevator shaft and vestibule before the tunnel junction blast door would be filled with rubble, sand, gravel, and/or dirt, and reasonably compacted to within 1 to 2 feet of the top of the shaft. A reinforced-concrete cap would be placed over the shaft to prevent settlement and to deny future access to the abandoned LCC structure. Air intake and exhaust ducts for the LCEB blast valves are exterior to the support building and would be filled and sealed with a 2-foot cap of reinforced concrete.

Two diesel USTs (capacities of 14,500 and 2,500 gallons with dimensions of 8 feet in diameter and 42.5 feet long and 5 feet 4 inches in diameter and 15 feet long, respectively) would be closed according to State requirements. The 14,500-gallon UST is located approximately 40 feet below the ground surface, and the 2,500-gallon UST is located approximately 4 feet below the ground surface. The piping would be drained for both tanks. The 2,500-gallon UST would be removed and the tank excavation area would be

backfilled and seeded. The 14,500-gallon UST would be permanently closed in place by filling the tank with an inert solid material. Soil samples would be taken adjacent to either side of the tank to check for contamination. If the samples were uncontaminated, the diesel fuel would be removed and 0.3 percent or less of the product would remain. The tank would be filled with pea gravel, concrete slurry, or other suitable fill material, and be closed in place following all applicable Missouri requirements.

A 2,000-gallon aboveground storage tank containing unleaded gasoline is located outside and adjacent to the security fence. This storage tank would also be drained and removed from the site.

Topside features within the fence, such as the receive and transmit antenna structures and ultra high frequency (UHF) antenna, would be filled, sealed, and abandoned in place.

The LCF waste disposal system removes and disposes of all sewage from the launch control support building (LCSB), LCEB, and the LCC. Waste water from the toilet and sink in the LCC, the drain in the LCEB, and the plumbing fixtures in the LCSB is discharged by a gravity flow drain line and a sump pump to the sewage lagoon. There is a single sewage lagoon located outside the security fence for each LCF, excluding the on-base LCF (Oscar-1), for a total of 14 lagoons. In the sewage lagoon, the sewage water is disposed of by evaporation. The solids in the sewage are oxidized by bacterial action into an inert sludge.

The liquid and solid contents of the lagoons would be tested prior to deactivation. The Toxicity Characterization Leaching Procedure (TCLP) test would be applied to both the liquid and sludge samples; the Normal Sewage Parameter (NSP) test for pH, Biochemical Oxygen Demand (BOD), Total Suspended Particulates (TSP), and ammonia will be applied only on liquid samples. Based on the NSP test results, the contractor may be permitted to discharge the effluent directly into the surface waters or, to utilize other proper disposal methods. The dismantlement design plans and specifications require the contractor to drain the lagoons, level and grade the berms for proper area drainage, and stabilize (mulch) and seed the area with native grasses. The soil preparation and seeding activities will be based on the Soil Conservation Service technical specifications for Missouri.

The plans for deactivating Oscar-1 have not yet been finalized. However, it is likely that if it is to be used as a museum, classified information and items would be removed and potential health hazards would be minimized to allow escorted public access to the facility.

2.2.5 Facilities Outside the MSB and Deployment Area

The main facilities involved in the deactivation process, other than Whiteman AFB, include Hill AFB and DOE facilities (see figure 2.2-2). Disposition of some missile components could go either directly to Newark AFB or indirectly through Hill AFB.

Pueblo Army Depot would receive some MGSs indirectly through Hill AFB. The RVs are scheduled for retirement and would be shipped (by DOE safe secure transport (SST) or Air Force airlift) to Pantex, near Amarillo, Texas, or other DOE holding facilities (which are classified). Although unlikely because the MM II missiles are being phased out, some of the MM II components recovered from the deactivation could be sent directly to Malmstrom AFB or Ellsworth AFB.

Much of the equipment and the MM II missiles themselves are the property of AFMC. As previously mentioned, once the rocket motors are removed from the LF and transported to the MSB, AFMC would handle and manage the motors to their final disposition. Former AFLC personnel were assigned at Whiteman AFB as part of the Rivet MILE (Minuteman Integrated Life Extension) program that helped upgrade and maintain the MM II system. The program was canceled recently, and no staff are assigned to Rivet MILE.

During the MM II deactivation planning for Ellsworth AFB, the Civil Engineering Maintenance Inspection and Repair Team (CEMIRT) at Kelly AFB, Texas, requested 15 diesel generators from the LFs and 5 generators from the LCFs for refurbishing for use as reserve generators at various Air Force installations. Some of the generators at Whiteman AFB may be similarly reused.

Vandenberg AFB, California, has test launch complexes for MM II and MM III missile systems, as well as for other ballistic missile systems. The base provides training for operations crews for all ballistic missile bases. Each year, Vandenberg AFB hosts the "Olympic Arena" contests that foster competition among teams from various ballistic missile bases. The event gauges the skill of the operations and maintenance personnel, evaluates the system's efficiency, promotes teamwork, and enhances morale. Under the proposed action, the training program for other bases with ICBM missile systems would continue. Two dedicated MM II training simulators are used at Vandenberg AFB in conjunction with the MM II training program. Although the ultimate disposition of these simulators is as yet unknown, they could be easily converted to MM III trainers.

The warheads scheduled for retirement would be returned to the DOE in accordance with the provisions contained in AFR 136-2, The Logistics Movement and Handling of Nuclear Cargo. Once returned to DOE, the warheads would be disposed of according to internal DOE procedures at a rate consistent with the Presidential Stockpile Memorandum. Further discussion of the handling of reentry vehicles is provided in section 4.7.2.1 and appendix E.

2.2.6 Personnel

Most of the DoD personnel affected by the proposed action at Whiteman AFB are the officers, airmen, and civilians associated with the MM II program at Whiteman AFB. Table 2.2.6-1 indicates that approximately 1,648 positions at Whiteman AFB would no longer be authorized after the fourth quarter of fiscal year (FY) 1995 under a 3-year

deactivation period; if the proposed action occurred over a slightly longer period, most of the personnel reductions would be in the last year of the deactivation.

Table 2.2.6-1
Personnel Reductions from the Proposed Deactivation

Personnel by Category	Fiscal Year 1993			Fiscal Year 1994			Fiscal Year 1995			THREE-YEAR TOTAL			
	O	A	C	O	A	C	O	A	C	O	A	C	Total
Operations	57	21	0	70	19	0	102	44	0	229	84	0	313
Maintenance	0	0	0	8	111	2	24	304	9	32	415	11	458
Communi-cations	0	0	0	0	0	0	0	54	3	0	54	3	57
Security Police	4	143	0	6	215	0	9	242	0	19	600	0	619
Base Operations Support	0	30	0	0	61	0	0	110	0	0	201	0	201
TOTAL	**61**	**194**	**0**	**84**	**406**	**2**	**135**	**754**	**12**	**280**	**1354**	**14**	**1,648**

Source: HQ SAC/XPM, 1992

The future of personnel involved in the deactivation is unknown. The following are the three main options for the 1,648 personnel who would be deactivated:

1) A significant share of the military positions would involve transfers (permanent change of station) to other military installations. Civilians could also transfer to other military or Federal Government agencies.

2) A certain portion of military personnel would be eligible for retirement, entitling them to choose their last duty station (possibly a base other than Whiteman AFB). Retired military personnel remaining in the Whiteman AFB area may choose to reenter the work force. Military personnel retiring through normal separation would have 1 year to activate their option of having the Air Force pay for their move back to their home of record or to an area of comparable distance and costs. Civilian personnel could choose to retire, but without the move benefits.

3) A certain segment of military personnel may be involved in a separation program: either voluntary or involuntary. Under the voluntary separation program, an incentive payment is provided for enlisted personnel with more than 9 years experience and officers with more than 6 years experience. If insufficient numbers of personnel elect this program, an involuntary separation program may be invoked. Under either program, the personnel

involved would receive some form of separation payment and a cost-reimbursable move for their families back to their home of record. Civilians could also leave the Air Force through a voluntary or involuntary separation program, but without the incentive payments.

Table 2.2.6-1 does not account for the addition of personnel associated with the realignment of the A/OA-10 wing from Richards-Gebaur AFB to Whiteman AFB, the basing of the B-2 at Whiteman AFB, and other potential future missions. Chapter 5 of this EIS provides personnel estimates and evaluates the potential cumulative impacts of the future missions in conjunction with the MM II deactivation.

The Air Force is restructuring and reducing the number of personnel in response to changing world events and overall budget limitations. In addition to the personnel reductions associated with the MM II deactivation program, Whiteman AFB authorizations are scheduled to be reduced by 31 in FY 1993, 255 in FY 1994, 13 in FY 1995, and 32 in 1997.

As the deactivation action at Whiteman AFB continues over approximately 3 years, it would be necessary to train fewer personnel at Vandenberg AFB. Two squadrons are dedicated to providing training and evaluation support for the ICBM systems: the 4315th Combat Crew Training Squadron and the 3901st Missile Evaluation Squadron. Minor personnel reductions at Vandenberg AFB are anticipated as a result of deactivating the MM II system at Whiteman AFB.

Currently, approximately 30 personnel are selected each year from the Whiteman AFB missile wing to go to Vandenberg AFB to compete in the annual "Olympic Arena" contests. Participation by Whiteman AFB personnel would decrease each year upon implementation of the proposed action and would cease when the last squadron at Whiteman AFB is deactivated.

2.2.7 Service Contracts

To maintain the capability of the 351 MW, the roads from the MSB to and within the deployment area must be kept in acceptable condition. The Air Force provides funding to the State and county departments of transportation for maintaining and improving these routes. Under the proposed action, funding for these roads would decrease annually during the deactivation period and would cease at the end of deactivation. Section 3.9 discusses current funding levels.

The LFs and LCFs use electricity provided by Rural Electrification Administration (REA) power companies as their primary source of power. The diesel generators serve as backup and supplementary power sources. Under the proposed action, the funding for these electricity contracts would decrease periodically during the deactivation period and would cease at the end of deactivation. Section 3.10 discusses current funding levels.

2.3 ALTERNATIVES

2.3.1 Continued Operation (No Action)

Under the "no action" alternative, the MM II system would not be deactivated. Instead, the maintenance and modernization of the system would continue. As indicated in section 2.2.2, missiles are removed routinely from launchers for maintenance and replacement. Missile removal operations under the no action alternative would be essentially the same as under the proposed action, except that this no action alternative would continue the present operations for re-installation of refurbished missiles.

Implementation of this alternative would not allow reductions of launchers and ICBMs according to the assumed requirements of a signed and ratified strategic arms reduction treaty. However, deactivation could occur later and still satisfy treaty requirements.

The continuation of operations would include, but is not limited to, the following activities: the HICS would be maintained; maintenance, routine replacement, and upgrade of support equipment in the LFs and LCFs would continue as at present; the MSB facilities would continue to be used for their existing purposes as described in section 2.2.1; and personnel of the 351 MW and support organizations would be retained to manage, operate, and maintain the missile system. However, the authorization reductions from DoD restructuring that are scheduled to occur at Whiteman AFB would result in the elimination of some 351 MW authorizations.

Electricity contracts for the deployment area would continue to be renewed and funds would continue to be provided by the Air Force to the State Department of Transportation for the upkeep and improvement of roads from the MSB to and within the deployment area. In addition, under the no action alternative, training and testing activities would continue at Vandenberg AFB, and it is possible that the Rivet MILE program would be reactivated.

2.3.2 Partial Deactivation

Instead of deactivating all 150 missile systems (three squadrons) at Whiteman AFB, the Air Force could choose to deactivate only one or two MSs (50 or 100 missiles with their associated LFs and LCFs, respectively).

This alternative is a hybrid of the no action and proposed action alternatives. Operations and maintenance of the LFs and LCFs within the squadron(s) not scheduled for deactivation would continue. A proportion of the program personnel who manage the system would be retained. Under this alternative, fewer personnel in support organizations at the MSB would be reassigned or discharged than under the proposed action.

Activities described in section 2.2 would occur at the MSB and at the deployment area for the squadron(s) scheduled for deactivation. The 50 LFs and 5 LCFs in an MS would

be deactivated while maintaining the system's nuclear surety. Although the funding for electricity contracts and road improvement and maintenance would decrease under the partial deactivation alternative, these costs would continue to be incurred by the Air Force. In addition, the level of training and testing activities would decrease slightly at Vandenberg AFB, and the Rivet MILE program would likely be reactivated with funding and personnel levels less than would occur under no action.

This alternative would require a larger investment over the long term than the proposed action. Also, if START is ratified and enforces limits on launchers and warheads, then the retention of a less reliable (the MM III and Peacekeeper missiles require fewer maintenance actions than MM II missiles) and less accurate system over other more advanced systems would not adequately maintain strategic deterrence within the constraints of the DoD budget.

2.3.3 Missile Removal and System Shutdown

This alternative would not abide with requirements for disabling the launchers under START protocols. Although the Treaty has been signed by the United States and the U.S.S.R., the requirements regarding strategic weapons and launchers are not enforceable until the Treaty is ratified by Congress. However, shutting down the system without performing the necessary Treaty requirements would result in continued maintenance costs. The United States would not receive credit for disabling the launcher, and newer, more efficient strategic launch systems could require dismantlement to meet Treaty requirements.

The missiles and critical, classified, and save list items would be removed from the LFs as projected for the proposed action. Deactivation activities at the LF would involve removal of the PCB filters, the ethylene glycol coolant system, and the DEUs and USTs. The LFSB would be demolished, filled, and graded. All these activities would also occur as part of the proposed action. However, under this alternative, lights, sump pumps, and cathodic protection wells would continue to be operated; dehumidifiers would be installed; and the headworks would not be demolished nor the launch tube filled with rubble and fill. The launcher closure door would be locked to prevent unauthorized access.

Deactivation activities at the LCFs, which would not commence until either the entire squadron of missiles is deactivated or until system security and control can be assured through the remaining LCFs, would involve the removal of critical, classified, and some save list items. The diesel UST would be removed but the DEU would remain. The elevator, antennae, sewage lagoons, and other items that would be difficult to replace, would be left intact.

A security force would likely oversee the LF and LCF sites. In addition to some security personnel, an undetermined number of personnel, would be retained to maintain the operating systems at the LF and LCF sites.

2.3.4 Alternatives Considered but Eliminated From Further Evaluation

Other alternatives considered included: a change in MW selected for deactivation/conversion and transfer of partially deactivated sites to the public.

2.3.4.1 Change in MW Selected for Deactivation/Conversion

In separate actions, the Air Force is converting the MM II system at Malmstrom AFB to MM IIIs (action started October 1991) and deactivating the MM II system at Ellsworth AFB (action started November 1991). The possible combinations of conversion and deactivation of the MM II systems at these bases, as well as the order of the actions, were evaluated as part of the environmental impact assessment process for the MM II Conversion EA for Malmstrom AFB (USAF, 1991e) and the MM II Deactivation EIS for Ellsworth AFB (USAF, 1991f). The analysis and findings of these studies are incorporated by reference (per 40 CFR 1502.21) into this EIS. Copies of the documents are available through the National Technical Information Service (telephone (703) 487-4600). Copies of the documents are also available from each base (Ellsworth AFB—telephone number (605) 385-2523; Malmstrom AFB—telephone number (406) 731-6165).

For several reasons, the possible combinations of actions, other than the one selected, were not reasonable and therefore were not further analyzed. The conclusion was based on the needs of national defense, Public Law 100-180, and the current capabilities and ages of the systems.

If the order of the base actions had been modified, the environmental impacts incurred from performing MM II system phaseout/conversion would not vary from those impacts predicted for the proposed actions; the impacts would occur at an earlier or later time.

2.3.4.2 Transfer of Partially Deactivated Sites to the Public

There have been several inquiries about the private or public use of the LFs and LCFs that would be only partially deactivated. After the classified and save-list items have been removed from the LFs and the site has been made environmentally safe (removal of the diesel fuel, PCBs, DEUs, and USTs, with testing for contaminants and the performance of any required remediation), the site would be disposed of without dismantlement. Classified and save list items would be removed from the LCF and the potential environmental hazards would be treated the same as planned for the LFs. The elevator would remain in operable condition and the blast doors would not be sealed.

Under this alternative, the launch tube could possibly be reused as a storage container or as a storm shelter. Use of the site in this manner would preclude the former launcher from qualifying as destroyed under START protocols. Past instances involving the disposition of former missile sites to private interests without fully deactivating the sites have led to problems. The Air Force was held liable for damages even though the property had been conveyed to another owner. For the aforementioned reasons, this

alternative was determined to be not reasonable and was eliminated from further evaluation.

The environmental impacts of not fully deactivating the LFs and LCFs would be less than those incurred from fully deactivating the sites. The impacts would be similar to those from implementing the missile removal and system shutdown alternative.

2.3.5 Implementation Alternatives

Within the proposed action, several options exist for implementation. These options are defined in sections 2.3.5.1 through 2.3.5.6.

2.3.5.1 Non-Demolition of the LF Headworks

Under this option, all activities would be essentially the same as described for the proposed action except the LF headworks would not be demolished. The missile, classified components, and possibly salvageable material would be removed from the LF, and the launch tube would be sealed to prevent access. This deactivation alternative would not satisfy START requirements to destroy the launcher.

Depending on the number and order of facilities that could be deactivated in this manner, the base personnel activities and other deactivation activities would be equivalent to those for the proposed action. For each LF deactivated, less site preparation and reclamation work would be necessary. Fewer contractor personnel would be required under this option because drilling and explosive demolition would not be necessary, and fewer fill and grading operations would be performed. The deactivation timeframe would differ negligibly from that required for the proposed action.

2.3.5.2 Mechanical Demolition of the LF Headworks

Mechanical demolition could also be used to destroy the headworks. However, this method has a number of practical difficulties. It may not be possible to store on site the soil and gravel excavated to mechanically demolish the headworks to a minimum depth of 8 meters (according to START protocols), and approval from the surrounding landowner(s) would be needed to temporarily store the material off site. Construction requirements limit the slope of the excavation to a 45-degree slope or a more gradual slope, affecting the drainage ditch around the site and possibly extending operations to or beyond the perimeter of the site. Also, the amount of time required to deactivate/dismantle the launch tube could exceed START-specified time limits. Because the Treaty has not yet been ratified, these restrictions apply only in the sense that it is more cost-efficient and practical to meet Treaty protocols. Modification of the work later to meet START protocols would be a costly and time-consuming process.

2.3.5.3 Reuse of Aboveground Facilities by the Air Force

The LF's gravel maneuver area and fencing could serve as remote locations for current or future Air Force programs. Under this option, the launch tube proper would be demolished and sealed as in the proposed action, but the Air Force would retain the land. The LCFs could be deactivated as described in section 2.2.4 but retained as remote locations for Air Force programs. However, the Air Force has decided that the only facility proposed for reuse is Oscar-1, an LCF. Consequently, Air Force reuse of LFs and LCFs, other than Oscar-1, will not be further evaluated.

2.3.5.4 HICS Removal

The HICS could be removed rather than left in place. The cable is buried 3 to 6 feet below ground. The Air Force has a perpetual easement of 16½ feet along the length of the HICS. A trench of several feet in width and slightly greater than the depth of the cable would have to be excavated to retrieve the cable. The Air Force would not need any permits from Missouri's Department of Natural Resources to remove the 1,777 miles of cable system. However, if the cable system were removed from beneath roads, resulting traffic restrictions would be coordinated with Missouri's Department of Highways and Transportation. The removal operations would take many hours and disturb land that had not been excavated for approximately 30 years.

2.3.5.5 Delay of Deactivation for 1 Year

If START is not ratified, it is possible that deactivation could be delayed for up to 1 year. The activities contemplated would be the same as those for the proposed action.

2.3.5.6 Removal of Deep-Buried LCF USTs

The Air Force plans on closing the deep-buried LCF USTs in place. However, an alternative would be to remove the USTs. To remove these USTs, an excavation of a large area would be required.

2.4 COMPARISON OF ALTERNATIVES

2.4.1 Overview

The key differences among the alternatives are in the scale of the action (ranging from 150 missiles and associated facilities at Whiteman AFB to no missiles or facilities deactivated), the timing (ranging from continued operations with no deactivation to approximately 3 years for complete deactivation), and the eventual disposition and new uses of the LFs and LCFs.

If the no action, partial deactivation, or missile removal and system shutdown alternatives, or the non-demolition implementation alternative were instituted and the

Treaty is ratified at a later date, deactivation and dismantlement could subsequently occur to meet the requirements specified in the Treaty.

2.4.2 The Environmental Effects of the Alternatives

Table 2.4.2-1 (which is based on analyses and discussions in chapter 4), summarizes the significance of potential impacts from implementing the proposed action or alternatives. Implementation alternatives were not included in the table but could be applied to three of the four action alternatives, excluding the no action alternative. Although partial deactivation could result in one or two squadrons being deactivated, the impacts described in table 2.4.2-1 are for implementation of the two-squadron deactivation option; the physical impacts of the one-squadron deactivation option would be equivalent to those specified for the proposed action, and the socioeconomic impacts would be insignificant. If an impact was locally insignificant, then it was also regionally insignificant. Effects considered over the entire 14-county deployment area would be considered regional impacts. Beneficial impacts were noted regardless of their significance. In addition to the table, environmental impacts of the alternatives are summarized in the following text.

Implementation of the proposed action would temporarily degrade the air quality along roads to, from, and within the deployment area and at the LFs and LCFs where construction activity would occur. The explosive demolition of the launcher headworks would cause emissions of dust and paint flakes. The demolition event could startle wildlife and local residents, rattle windows, microfracture adjacent rock formations, and cause slumping (sudden downgradient movement of rock and/or soil). Yields could be decreased from water wells in particularly sensitive formations. Seepage of nearby reservoirs could occur from microfracturing of underlying rocks. Traffic to, from, and within the deployment area would increase slightly, as would base traffic. Air operations, with associated noise and air quality effects, would increase over baseline levels for the transport of missile parts from Whiteman AFB to DoD and DOE facilities. Soil erosion would increase at the LF and LCF sites during construction activities. Fill excavated from established borrow areas would be transported by dump truck to the LF and LCF sites. Hazardous materials and wastes, and special wastes (e.g., asbestos and PCBs) would be removed from the sites. Local employment opportunities to support the deactivation would increase. The population of the area would decrease, causing an increase in housing vacancy rates, decreased school enrollment, and decreased spending in nearby communities.

Table 2.4.2-1

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated)[2]	Missile Removal and System Shutdown
AIR				
Emissions from aircraft	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant
Emissions from on-base vehicular traffic	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant
Fugitive dust, vehicle emissions, and launcher demolition emissions in the deployment area	ST: Adverse and locally insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Adverse and locally insignificant LT: Beneficial and locally insignificant	Insignificant
GEOLOGY				
Ground motion effects on structure and occupants from explosive demolition	ST: Adverse and locally insignificant LT: Not applicable	Not applicable	ST: Adverse and locally insignificant LT: Not applicable	Not applicable
Slumping of unstable terrain caused by seismic activity associated with explosive demolition	Insignificant	Not applicable	Insignificant	Not applicable
Activation of faults from demolition seismic activity	Insignificant	Not applicable	Insignificant	Not applicable
Excavation of fill	ST: Adverse and locally insignificant LT: Insignificant	Not applicable	ST: Adverse and locally insignificant LT: Insignificant	Not applicable
Soil compaction and erosion in deployment area	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 2.4.2-1 (Continued)

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated)[2]	Missile Removal and System Shutdown
WATER				
Excavation effects on aquifer	Insignificant	Not applicable	Insignificant	Not applicable
Launcher headworks demolition effects on aquifer	Adverse and locally significant, regionally insignificant	Not applicable	Adverse and locally significant, regionally insignificant	Not applicable
Launcher headworks demolition effects on water wells	Adverse and locally significant, regionally insignificant	Not applicable	Adverse and locally significant, regionally insignificant	Not applicable
Surface- and ground-water quality	Insignificant	Insignificant	Insignificant	Insignificant
Surface-water quantity	ST: Adverse and locally significant, regionally insignificant LT: Insignificant	Insignificant	ST: Adverse and locally significant, regionally insignificant LT: Insignificant	Insignificant
BIOLOGY				
Siltation of streams from increased erosion and runoff	Insignificant	Insignificant	Insignificant	Insignificant
Startle effect on wildlife and domestic animals	Insignificant	Insignificant	Insignificant	Insignificant
Habitat excavated for fill	Insignificant	Not applicable	Insignificant	Not applicable
Crop/vegetation damage from erosion or contamination migrating from site	Insignificant	Insignificant	Insignificant	Insignificant
CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL				
Damage to fragile historic structures and artifacts from explosive demolition	ST: Insignificant LT: Not applicable	Not applicable	ST: Insignificant LT: Not applicable	Not applicable
Loss of LFs and LCFs as historic structures	Insignificant with proposed mitigation	Not applicable	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 2.4.2-1 (Continued)

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated[2])	Missile Removal and System Shutdown
CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL (Continued)				
Disruption of Native American ceremonies or activities	Insignificant	Insignificant	Insignificant	Insignificant
Archaeological or paleontological resources uncovered by ground disturbance during borrow excavations	Beneficial and locally insignificant	Not applicable	Beneficial and locally insignificant	Beneficial and locally insignificant
HUMAN HEALTH AND SAFETY/HAZARDOUS WASTE				
Removal of asbestos-containing materials, PCBs, and other hazardous materials from deployment area—effect on nearby residents	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial
Removal of asbestos-containing materials, PCBs, and other hazardous materials—effect on workers	Insignificant	Insignificant	Insignificant	Insignificant
Increased solid waste generation and disposal	Insignificant	Not applicable	Insignificant	Insignificant
Removal of USTs—effects on workers	Insignificant	Not applicable	Insignificant	Insignificant
Removal of USTs—effects on soil and ground water	ST: Insignificant LT: Beneficial	Not applicable	ST: Insignificant LT: Beneficial	Insignificant
Explosive demolition of launcher and cutting of metal covered with lead-based paint	Insignificant	Not applicable	Insignificant	Not applicable
Draining of fuels, coolants, and lubricants—effects on workers	Insignificant	Insignificant	Insignificant	Insignificant
Generation, storage, and disposal of hazardous waste	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 2.4.2-1 (Continued)
Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated[2])	Missile Removal and System Shutdown
NOISE				
Aircraft noise	ST: Insignificant LT: Beneficial	Insignificant	Insignificant	ST: Insignificant LT: Beneficial
Explosive demolition noise	ST: Insignificant LT: Not applicable	Not applicable	ST: Insignificant LT: Not applicable	Not applicable
Traffic noise to and from deployment area	ST: Insignificant LT: Beneficial	Insignificant	Insignificant	Insignificant
TRANSPORTATION				
Traffic to and from deployment area	ST: Insignificant LT: Beneficial	Insignificant	ST: Insignificant LT: Beneficial	Insignificant
Accidents	ST: Insignificant LT: Beneficial	Insignificant	ST: Insignificant LT: Beneficial	Insignificant
Deployment area road upkeep and funding	ST: Insignificant LT: Adverse and locally insignificant	Insignificant	ST: Insignificant LT: Adverse & locally insignificant	Insignificant
SOCIOECONOMICS				
Employment opportunities from deactivation process	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	Not applicable	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant
Population change—impact on services	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	Not applicable	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant
School enrollment	Significantly adverse locally and regionally insignificant	Insignificant	Significantly adverse locally and regionally insignificant	Significantly adverse locally and regionally insignificant
Federal Impact Aid to schools	Insignificant	Insignificant	Insignificant	Insignificant
Housing	Significantly adverse locally and regionally insignificant	Insignificant	Significantly adverse locally and significant and regionally insignificant	Significantly adverse locally and regionally insignificant
Land use	Insignificant	Insignificant	Insignificant	Insignificant
Utilities—effects on rural electrification cooperatives	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Compared to the proposed action, the no action alternative would cause no new, additional impacts beyond those routinely associated with site operations. The following are ongoing impacts from the 351 MW mission:

- Soil sterilization around the LFs and LCFs causes potential herbicide residue accumulation in the soil.

- Wear on service roads used by TE, RV/G&C vans, and other MM II vehicles causes erosion and siltation.

- Vehicular traffic associated with operations and maintenance of the MM II workforce causes air pollutant emissions.

- The MM II workforce uses utilities (water, sewage, energy) and services (police, fire, health care, schools).

- Operation and maintenance of the MM II system causes direct and indirect employment.

Under the no action alternative, therefore, these continuing and incremental impacts would be incurred, but none of the proposed action's impacts related to destruction of the LFs, LCCs, and other support buildings would be incurred.

The partial deactivation alternative would cause the same types of impacts as the proposed action, but to a lesser degree in an aggregate sense. The impacts at a specific location where deactivation is occurring would be equivalent to those described for the proposed action. This alternative would still result in potentially significant local impacts, such as those associated with launcher demolition, but at fewer locations. This partial deactivation alternative, however, would also continue impacts from the use of pesticides at the LFs and LCFs. The magnitude of socioeconomic dislocation and the overall cumulative impacts within the deployment area would be less under this alternative than under the proposed action.

The missile removal and system shutdown alternative would involve many of the same impacts as would occur under the proposed action. However, minimal fill would be needed and explosive demolition, with its associated impacts, would not occur. The physical impacts would occur throughout the deployment area during a timeframe similar to that of the proposed action. The socioeconomic impacts would be slightly less than those projected for the proposed action because personnel would be retained to provide maintenance and security for the LF and LCF sites.

The non-demolition option would avoid the potential air emissions, seismic, and aquifer impacts associated with explosive demolition. Other types of impacts in the deployment area (such as soil compaction, erosion, and workforce impacts) would be the same as for the proposed action. The extent of these impacts would vary from those incurred during the proposed action; the soil in the LF and LCF areas would be less disturbed from

decreased operations on and around the headworks area. The number of contractor personnel and the time for deactivation would be slightly less than required for the proposed action.

Mechanical demolition of the headworks rather than the use of explosive demolition techniques would cause more air emissions over a longer period of time; decrease the magnitude of ground shock; occur over a longer period of time; disturb the geology and hydrology to a lesser extent; disturb people, wildlife, and range animals for a longer period of time; cause more construction accidents; increase traffic to, at, and from the deployment area; and increase construction employment.

Removal of the HICS rather than abandoning it in place would cause increased air emissions, both from machines and the disturbed soil; cause more erosion of soils and siltation of streams; disturb crops and wildlife habitat; result in increased traffic to, at, and from the deployment area; temporarily increase noise levels in sections of the deployment area; and increase construction employment.

The environmental impacts of delaying deactivation for 1 year would be the same as those likely to occur under the proposed action, but would start 1 year later.

Removal of the deep-buried UST at each LCF differs from in-place closure in that a potential contamination source, albeit only a small amount of product is left, would be eliminated.

CHAPTER 3
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 DESCRIPTION OF WHITEMAN AFB AND THE DEPLOYMENT AREA

This chapter begins with a discussion of the history, mission, and current operations of Whiteman Air Force Base (AFB), followed by a description of the area's present environmental and socioeconomic resources. The resources described have the potential to be affected by the alternatives discussed in chapter 2. Those resources that are more likely to be affected (e.g., geology) by the proposed action are described in more detail than those resources that are less likely to be affected (e.g., biology).

3.1.1 History of Whiteman AFB

Whiteman AFB began as the site of the Sedalia Army Air Field in 1942, also serving as a training base for glider pilots. At the end of World War II, the airfield served as the operating location for Army Air Force C-46 and C-47 transports. Inactive from December 1947 until August 1951, the base was redesignated as Sedalia Air Force Base and activated by the new U.S. Air Force (USAF) Strategic Air Command (SAC) as the site of the 340th Bombardment Wing (USAF, 1990c) with B-47 and KC-97 aircraft.

In October 1955, the name of the base was changed to Whiteman Air Force Base in honor of Second Lieutenant George A. Whiteman, a native of Sedalia, MO, who was one of the first airmen fatalities during the attack at Pearl Harbor on December 7, 1941.

As Whiteman AFB entered the 1960s, its mission shifted from that of a Bombardment Wing to that of a Missile Wing (MW). The 340th Bombardment Wing gradually phased out operations at Whiteman AFB during the 1960s and transferred to Bergstrom AFB, TX (ORNL, 1987). In June 1961, Whiteman AFB was chosen to be the site of SAC's fourth Minuteman MW, the 351st Strategic Missile Wing (in 1991, "Strategic" was dropped from the title). The wing was activated in February 1962, and construction of the necessary facilities for the Minuteman I (MM I) missiles began in April 1962. In 2 years, 2 months, and 2 weeks, 150 intercontinental ballistic missile (ICBM) launch facilities (LFs) and 15 launch control facilities (LCFs) were at full operational capability.

From May 1966 to October 1967, the MM I missiles at Whiteman AFB were replaced by the Minuteman II (MM II) missile (USAF, 1990a). The operational safety and security capabilities of the missile system were upgraded from March 1978 to 1980. In June 1985, a program known as Rivet MILE (Minuteman Integrated Life Extension) was instituted to recondition and improve the maintainability of the Minuteman missile's launch facilities and launch control facilities.

3.1.2 Mission and Operations

Whiteman AFB hosts the 351 MW and its support organizations, Detachment 509 (Det 509); Detachment 9, 37th Air Rescue Squadron (Det 9, 37 ARS) and associated tenant organizations. The Missouri Air National Guard, located in Jefferson City, Missouri, also operates 31 helicopters out of Whiteman AFB.

The 351 MW's mission is to maintain three squadrons—the 508th Missile Squadron (MS), the 509 MS, and the 510 MS—of MM II ICBMs in a constant state of readiness. The 351 MW acts in concert with other strategic forces to deter war by developing the capability to conduct strategic warfare and to train highly qualified personnel to man, maintain, and launch, if so directed, its force of MM II ICBMs.

Det 509 is the organization tasked with all the requirements to activate the first operational base for the B-2 Advanced Technology Bomber program. The mission of Det 509 is to manage and direct base planning to provide the required infrastructure capable of maintaining and operating the B-2 program for basing at Whiteman AFB.

Det 9, 37 ARS's primary mission is to support the 351 MW using HH-1H "Huey" helicopters. Det 9, 37 ARS operates helicopters that are owned by Military Airlift Command and maintained through a Strategic Air Command contractor. This detachment flies medical evacuation missions and provides support for crew swaps, bioenvironmental health, civil engineering, services, communications, and public affairs resulting in considerable person-hours and vehicle miles saved (Curtis, 1992).

Organizations that support the 351 MW include the 351st Support Group, the 351st Communications Squadron, the 351st Civil Engineering Squadron, and the 351st Security Police Squadron. In addition, the 351st Operational Support Squadron Weather Office provides weather support to Whiteman AFB, as well as pilot weather briefings for Richards-Gebaur AFB and Missouri National Guard aviation units across Missouri (USAF, 1990c).

3.1.3 Future Activities

Detachment 509 is the precursor to the 509th Bomb Wing (509 BW). The 509 BW would replace the 351 MW as the host organization at Whiteman AFB, which is dependent on the deactivation of the 351 MW. Whiteman AFB is the first location of basing for the B-2 aircraft. The B-2 action would include the assignment of personnel to Whiteman AFB, and the construction of facilities and infrastructure to support the mission. To support the B-2 training program, T-38 aircraft would also be based at Whiteman AFB.

Future missions at Whiteman AFB also include the transfer of the 442nd Fighter Wing (FW) from Richards-Gebaur AFB, Missouri. This action, mandated by the Defense Base Closure and Realignment Act, will consist of the beddown of A/OA-10 aircraft, transfer of full-time personnel, assignment of drill personnel, and construction of facilities and infrastructure to support the 442 FW. Whiteman AFB may also serve as the location for

other tenant organizations, such as the Missouri National Guard. Discussions have been held concerning the relocation of the Armory from Warrensburg, Missouri, to Whiteman AFB.

Construction activities have been ongoing at Whiteman AFB in preparation of the activation of the 509 BW. Whiteman AFB would retain a sound infrastructure to support other missions if this action does not occur.

3.1.4 Installation Environmental Programs

U.S. Air Force installations engage in many operations and activities that can cause environmental impacts on public health and the environment if not controlled or properly managed. Many of these activities and operations are governed by Federal regulations (including Department of Defense (DoD) and Air Force regulations), as well as state and local regulations.

The environmental management program at Whiteman AFB is administered by the Environmental Engineering Flight (DEV) in the Civil Engineering Squadron (CES) of the 351st Support Group (SPTG). The squadron provides support to the 351 MW, Det 509, Det 9, and other on-base tenant organizations, whereas the Environmental Engineering Flight has primary responsibility for environmental compliance with all applicable regulations, standards, and laws that apply to the installation. To ensure that operations and activities of Whiteman AFB do not result in serious deficiencies of compliance with environmental requirements, a yearly evaluation is conducted.

The following text briefly describes the baseline conditions for the environmental management of hazardous waste, solid waste, waste water, air emissions, the installation restoration program, and other programs, such as the cultural and natural resources program.

3.1.4.1 Hazardous Materials/Wastes

Hazardous materials are used and hazardous wastes are generated at Whiteman AFB during daily base activities (including those occurring at the deployment area) and are managed by the Environmental Engineering Flight. On-base hazardous waste generation in calendar year 1991 amounted to approximately 184,000 pounds. Of this amount, approximately 45 percent (82,000 pounds) was generated by MM II activities.

Hazardous materials from base activities that are awaiting reuse/recycling are stored at several recycling collection areas on base. These materials are then reused/recycled through a base contract administered by 351 SPTG/DEV. The 351 SPTG/DEV office is responsible for proper storage of hazardous wastes and transport of the wastes to Environmental Protection Agency (EPA)-approved treatment and disposal facilities. The Defense Reutilization and Marketing Office (DRMO) at Whiteman AFB provides storage of hazardous wastes and arranges transport of the wastes to treatment and disposal facilities for the Air Force. The wastes are stored at centralized collection/accumulation

points and at the DRMO conforming storage facility. Wastes are not allowed to be stored in centralized accumulation points for more than 90 days.

The reused/recycled materials include, but are not limited to, ethylene glycol, oils, diesel fuel, and batteries. Wastes include spent sodium chromate solution, batteries (that are not reusable) and battery acid, contaminated oils, paints, thinners, solvents and other regulated wastes. Hazardous materials and wastes that are routinely handled during maintenance activities for the MM II are discussed in section 3.7.

3.1.4.2 Solid Wastes

Solid waste is removed from Whiteman AFB by a contractor and disposed of in the Johnson County Landfill located in Warrensburg. A total of 7,800 cubic yards (CY) per year (approximately 150 CY per week) of trash were removed from Whiteman AFB in 1990 (USAF, 1991i). Refuse from the LCFs and LFs is brought back to the base, placed in a dumpster, and removed by a contractor along with other refuse. The current usage rate at the landfill is approximately 219,000 CY per year (600 CY/day), of which 4 percent is from Whiteman AFB. The county landfill is estimated to have a remaining lifespan of approximately 2 years; however, the county has started action to obtain another permitted site for 80 acres adjacent to the landfill within the next 6 to 9 months. The new site is projected to be useable for 25 years.

Whiteman AFB has also initiated a recycling program managed by the 351 SPTG/DEV to recycle corrugated cardboard, lead-acid batteries, aluminum cans, tin cans, plastic (HDPE #2 and PETE #1), and paper (bond and computer). Other types of industrial recyclable materials such as copper, aluminum, brass, rubber, and woods, and government furnishings and equipment such as desks and file cabinets are for resale by the DRMO office.

3.1.4.3 Wastewater

The wastewater treatment plant (WWTP) at Whiteman AFB receives both industrial and domestic influents and treats the waste by anaerobic digestion. The rated capacity of the WWTP is 1.35 million gallons per day (MGD); however, the average daily flow of influent and effluent is only approximately 0.6 MGD. The WWTP is being upgraded to increase the capacity to approximately 2.0 MGD by the end of the summer 1992. The upgrade will include new clarifiers, trickling filters, sludge digesters, and a press facility for sludge dewatering. This facility has a National Pollutant Discharge Elimination System (NPDES) permit that limits the types and concentrations of discharges from the treated effluent. Although the WWTP is in compliance with the NPDES permit, some of the limits of the permit were temporarily and occasionally exceeded during 1989-1991.

3.1.4.4 Air Emissions

The 351 SPTG/DEV is responsible for ensuring that all applicable air quality standards and air permit requirements are complied with. Section 3.2.3 provides details of current air quality permits and compliance status.

3.1.4.5 Installation Restoration Program

Past waste management activities at Whiteman AFB have had the potential to contribute to soil and groundwater contamination at the base. A portion of these activities have included the use of petroleum products, pesticides, cleaning chemicals and burial of demolition/construction debris at various areas on the base. Under the mandate of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), the Air Force is actively pursuing a program to address and, as necessary, remediate environmental concerns created by these past practices. The Installation Restoration Program (IRP) is the basis for response actions on Air Force installations under the provisions of CERCLA and SARA. The IRP of the Air Force consists of four phases:

- Preliminary Assessment/Site Inspection (PA/SI)
- Remedial Investigation/Feasibility Study (RI/FS)
- Remedial Design/Remedial Action (RD/RA)
- Site Closeout (SC)

There are currently 18 sites that have been included in the IRP at Whiteman AFB with ten of these sites having been identified by the Air Force as closed. The sites still subject to remedial action include landfill areas, a washrack area, fire training pit area, underground storage tanks, chemical treatment sites, and pesticide disposal areas. None of these sites are at the LFs and LCFs, nor have they been identified for placement on the National Priority List (NPL). These sites are currently in the RI/FS or RD/RA stages. In addition, seven potential sites have been named and will be included in the IRP once the sites are reviewed and validated by Headquarters Air Force. The Installation Restoration Program is managed by the 351 SPTG/DEV.

3.1.4.6 Other Programs

The 351 SPTG/DEV oversees the management and execution of other programs such as the cultural and natural resources program.

3.2 AIR RESOURCES

3.2.1 Climate and Meteorology

Whiteman AFB and the 351 MW deployment area experience a mean annual daily maximum temperature of 64°F and minimum temperature of 45°F. Mean monthly temperatures range from 28°F in January to 79°F in July. Extreme daily temperatures range from -19°F in winter to 107°F in summer. Approximately 260 days per year, from the beginning of April through October, are frost free throughout the deployment area (USAF, 1988).

The mean wind speed ranges from 8 miles per hour (mi/hour) in winter months to 5 mi/hour in the summer. The prevailing wind direction is to the south all months of the year except January, when the prevailing wind direction is to the north. The area's relative humidity is considered moderate to high (typically 55 to 80 percent). Visibility is less than 7 miles at various times of the day on an average of 120 days per year as a result of fog (USAF, 1988).

Total annual precipitation measured at Whiteman AFB averages 40.4 inches (in.), with more than 34 percent received during April through June. Approximately 25 in. of snow falls each year, constituting about 5 percent (water equivalent) of annual precipitation.

The area has a tornado hazard potential of 1 mi^2 of damage per 5,000 mi^2/year. For the 4,900 mi^2 contained within the deployment area, this potential is about 1 mi^2 of damage per year (USAF, 1983).

3.2.2 Air Quality

The National Ambient Air Quality Standards (NAAQS), established by the EPA, define the maximum allowable concentrations of pollutants that may be reached but not exceeded within a given time period. These standards were selected to protect human health, with a reasonable margin of safety. Exceeding a concentration level in that given time period is a violation and constitutes a nonattainment of the pollutant standard. The Missouri Department of Natural Resources has adopted the NAAQS to judge the outdoor air quality by comparing area air pollutant amounts to the standards. Table 3.2.2-1 presents the NAAQS for the six criteria pollutants.

The air quality of the deployment area and Whiteman AFB is good. Fourteen counties constitute the region of influence (ROI) for this study: Saline, Cooper, Moniteau, Morgan, Benton, Cedar, Vernon, Bates, Cass, Johnson, Henry, St. Clair, Lafayette, and Pettis.

Table 3.2.2-1 Air Quality Standards			
Pollutant	**Unit**	**Averaging Time**	**NAAQS**[a]
Ozone (O_3)	µg/m^3	1 hr	235
Carbon Monoxide (CO)	µg/m^3	1 hr 8 hr	40,000 10,000
Nitrogen Dioxide (NO_2)	µg/m^3	24 hr AAM[b]	--- 100
Sulfur Dioxide (SO_2)	µg/m^3	3 hr 24 hr AAM	1,300[c] 365[d] 80[d]
Particulate 1 Matter (PM_{10})	µg/m^3	24 hr AAM	150 50
Lead (Pb)	µg/m^3	¼ year	1.5

[a] Primary and secondary NAAQS standards unless otherwise noted.
[b] Annual Arithmetic Mean.
[c] Secondary standard.
[d] Primary standard.

The ROI is in attainment status for all criteria pollutants. Within Missouri, only the downtown areas of Kansas City and St. Louis are listed as ozone nonattainment areas, and the inner portion of St. Louis is listed as a carbon monoxide nonattainment area (MDNR, 1991). On the basis of 1991 monitoring results for ozone in the Kansas City area and carbon monoxide in the St. Louis area, the State of Missouri is negotiating with EPA regarding the approval of these areas as attainment areas (Howard, 1992).

Prevention of Significant Deterioration (PSD) Regulations (40 CFR 52.21) define air quality levels that cannot be exceeded by major stationary emission sources in specified geographical areas. Major stationary sources are usually sources that emit more than 100 tons per year of a specific pollutant. Whiteman AFB is an existing major source of air contaminants. PSD regulations establish limits on the increments of SO_2, NO_2, and total suspended particulates (TSP) that may be emitted above a premeasured amount in each of three class areas. Class I areas are pristine areas and include National Parks and Wilderness areas. All other areas in the United States are classified as Class II, areas in which moderate, well-controlled industrial growth can be permitted. No Class I areas exist in the deployment area or in counties that border the ROI (Stansfield, 1991). Visibility in the deployment area ranges between 17 and 20 miles, with haze, fog, and precipitation being the primary causes for occasional visibility restrictions (USAF, 1986).

Sensitive areas in or near Whiteman AFB which are shown in figure 3.2.2-1 and referenced in appendix F include Knob Noster State Park, Bothwell State Park, Montrose Wildlife Area, Lake of the Ozarks, Pomme de Terre Lake, Stockton Lake, Shell-Osage

Wildlife Area, and Marias des Cygnes Waterfowl Refuge. Knob Noster State Park borders Whiteman AFB in Johnson County. Bothwell State Park and Shell-Osage Wildlife Area, in Pettis and Vernon Counties respectively, are the only other sensitive areas within the deployment area. Montrose Wildlife Area, Lake of the Ozarks, Pomme de Terre Lake, and Stockton Lake are to the south and east of the deployment area in Henry, Benton (and others), Hickory, and Cedar Counties, respectively. Marias des Cygnes Waterfowl Refuge lies approximately 10 miles east of the deployment area in Linn County. These areas are considered sensitive because they serve as prominent wildlife habitat and have recreational benefits. The quality of air and its effect on visibility influences the quality of the wildlife habitat and the aesthetic and recreational value of these areas.

Toxic air pollutants are those pollutants that have been listed by the Clean Air Act Amendments of 1990 that are hazardous to human health or the environment, but are not specifically covered under another part of the Clean Air Act. The National Emissions Standards for Hazardous Air Pollutants (NESHAPS) and Missouri air regulations regulate several of these toxic air pollutants, including arsenic, asbestos, benzene, beryllium, coke oven emissions, mercury, radon, other radionuclides, and vinyl chloride. Of the counties in the deployment area, Vernon county contributed 7.6 percent of state totals of toxic chemical air emissions in 1988 (MDNR, 1991). All other counties in the deployment area contributed less than three percent of the total toxic chemical air emissions in the state.

3.2.3 Base Air Quality

Although the ROI is in an attainment zone (thus, no special regulation or monitoring of Whiteman AFB's overall emissions is required), applications for permits to construct new stationary sources are required and reviewed by the Missouri Department of Natural Resources, Air Pollution Control Program, New Source Review Section. This air/permitting process ensures compliance with air pollution control regulations including NAAQS, NESHAPS, and PSD New Source Performance Standards (NSPS). Whiteman AFB currently has received Permits to Construct (which also include operational criteria) from the State of Missouri for the following sources: Central Heating Plant (boiler number 4, permit number 1083-003), Central Heating Plant (boiler number 5, permit number 0688-004A and 0688-005A), Organic Liquid Storage Tank (permit number 1080-001A), Hydrant Fuel Facility (permit number 0291-002), Emergency Diesel Generator and three Underground Storage Tanks (permit number 1291-003), and Emergency Diesel Generator and 15,000 Gallon Underground Diesel Fuel Storage Tank (permit number 0191-002). The permit for boiler number five requires performance testing to ensure that emission limitations are met for this individual source. The SPTG/DEV manages the air/permitting process at Whiteman AFB.

Whiteman AFB compiles an annual summary of emissions for presentation to the State of Missouri to ensure no degradation of air quality has occurred in Johnson County. According to the Emissions Inventory for calendar year 1990, motor vehicles (private and government), traveled an estimated 8.8 million miles and generated approximately 72

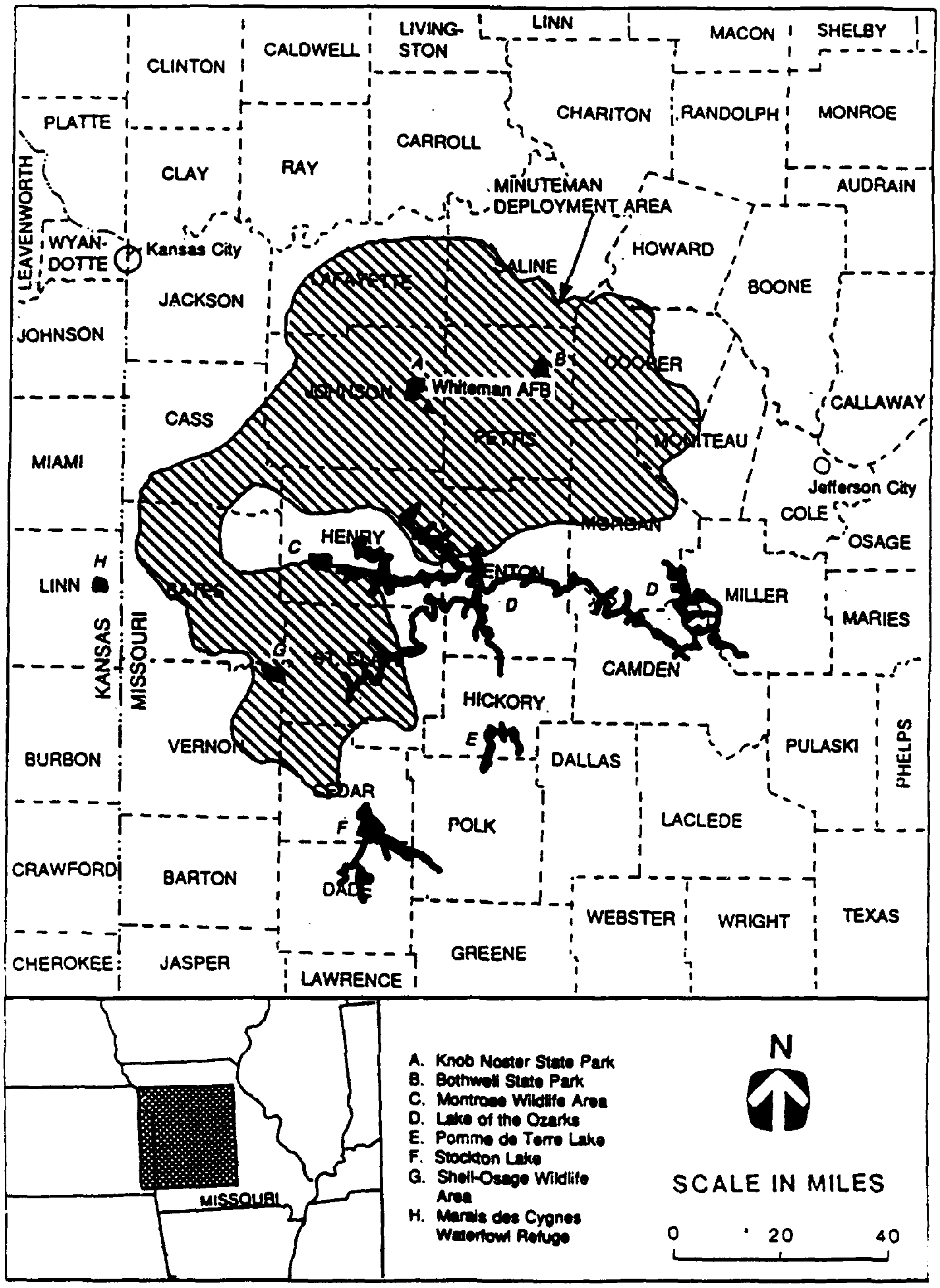


Figure 3.2.2-1 Sensitive Areas in the Deployment Area

percent of the pollutant emissions associated with the base. Aircraft (airplane and helicopter) performed an estimated 488 landing-takeoff operations and generated less than one percent of the total pollutant emissions on-base in 1990. The runway was inoperable in 1990 because of pavement work to support the B-2 mission. In 1989, when the runway was operational, aircraft performed an estimated 4,400 landing-takeoff operations and generated approximately 8 percent of the total pollutant emissions on base. Other on base emission sources in 1990 included fire training exercises, heating, generators, fuel evaporation, and surface coating operations.

3.3 GEOLOGICAL RESOURCES

3.3.1 Physiography and Topography

Whiteman AFB and the MM II system deployment area are within the physiographic provinces known as the Central Lowlands and the Interior Highlands (represented by the Ozark Plateau; figure 3.3.1-1). The deployment area can be further separated into four additional physiographic subregions: the Dissected Till Plains, the unglaciated Osage Plains, the Springfield Plateau, and the Salem Plateau. The physiography of the deployment area varies from flatlands, in the western counties located in the Osage Plains and in the Dissected Till Plains to the north, to the rolling hills of the Springfield Plateau and Salem Plateaus to the south. The geology of these areas has influenced the development of the physiography and is described in section 3.3.2. The 150 LFs and 15 LCFs of the 351 MW extend throughout approximately 5,300 square miles of west central Missouri (COE, 1989).

3.3.2 Geology

The geology of the deployment area consists primarily of limestones, dolomites, shales, siltstones, and sandstones, in nearly horizontal beds, ranging in age from the Pennsylvanian period (265 million years) to the Precambrian period (570 million years). The surficial materials in the deployment area consist of Quaternary-age alluvium and glacial deposits. This overburden contains residual clays and silts in depths of 10 to 30 feet, and rock fragments consisting of gravel- to boulder-sized pieces (COE, 1989). Figure 3.3.2-1 illustrates the surficial geology of western Missouri. The geology of the Dissected Till Plains consists of glacial materials that were deposited primarily on Pennsylvanian-age sedimentary rocks (MDNR, 1986). The geology of the Osage Plains portion of the deployment area generally consists of alluvium overlying Pennsylvanian rocks composed of limestone, shale, siltstone, sandstone, coal, and claystone (USAF, 1990 and COE, 1989). The geology of the Springfield Plateau area consists primarily of alluvium overlying cherty (silica-rich) limestone, which grades down locally to dolomite, and some Mississippian-age shale. The geology of the Salem Plateau consists primarily of alluvium overlying Cambrian- and Ordovician-age carbonates (predominantly cherty dolomite), with a few Mississippian-age limestone outliers.

Energy and mineral resources are located within the deployment area, as referenced in appendix F. The deployment area in Bates, Cass, Cedar, Lafayette, Pettis, St. Clair, and Vernon Counties contains oil and gas fields and heavy oil deposits. Oil and gas are currently being produced in only 3 counties (Bates, Cass, and Vernon) of the 14 counties in the deployment area (Jaquess, 1991). The hydrocarbon-producing counties are situated in the western and north-central portions of the deployment area (figure 3.3.2-2). Most oil wells in Vernon County were drilled in 5-acre areas (one well per 5-acre area) because the high viscosity of the oil often requires heat applications prior to withdrawal. The oil and gas wells in Cass and Jackson Counties tend to be closer together because the oil is less viscous in these regions (Jaquess, 1992).

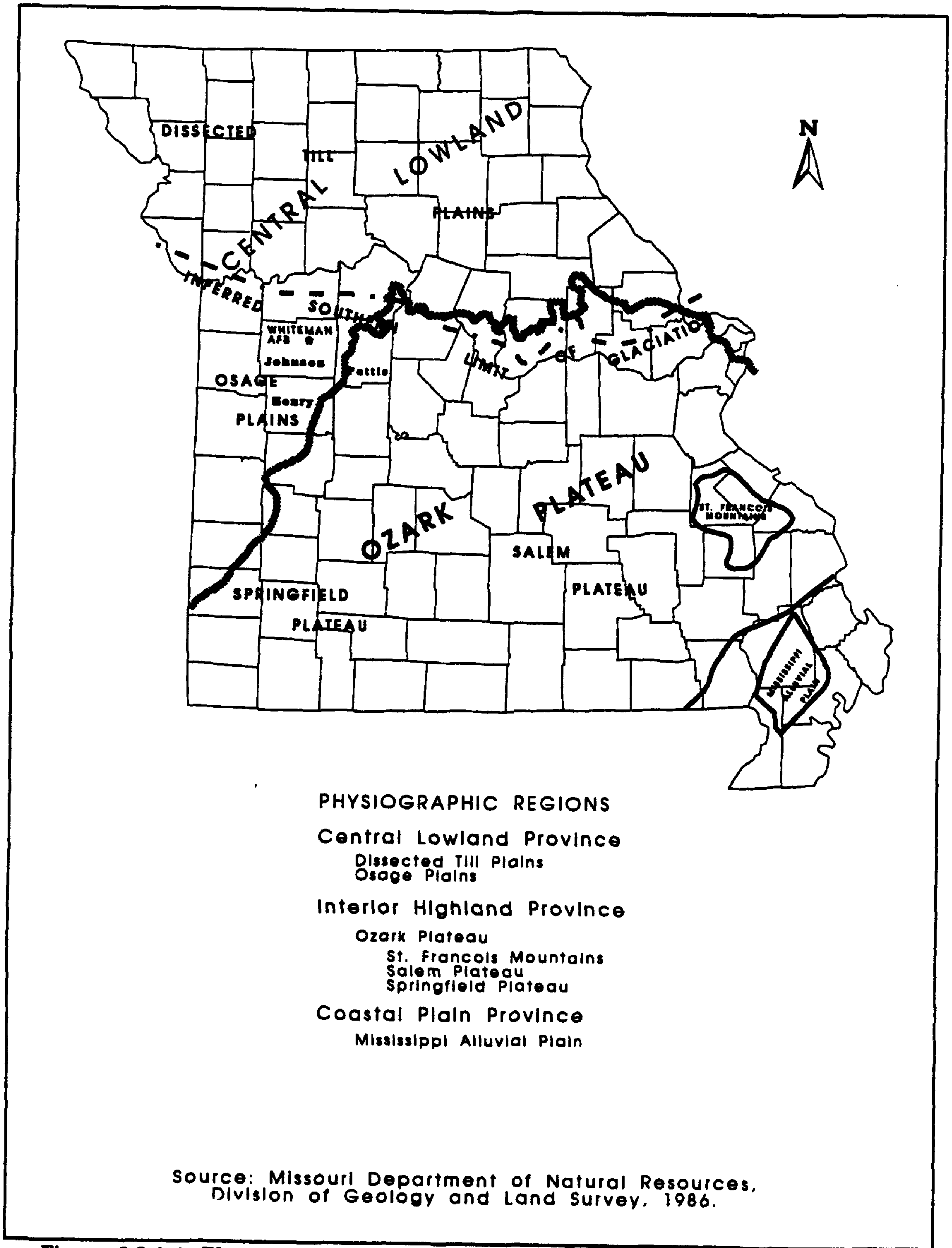
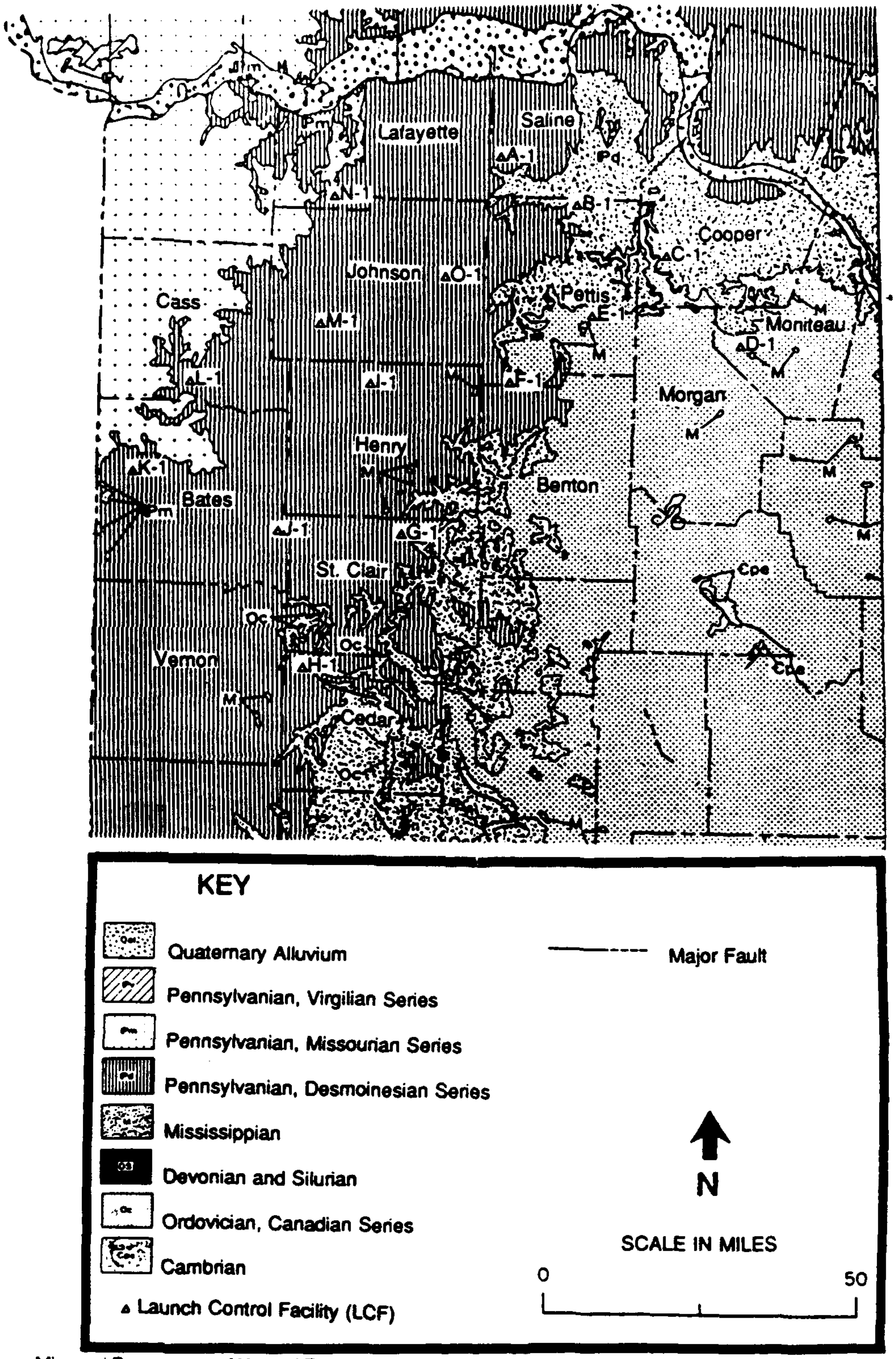


Figure 3.3.1-1 Physiography of the Deployment Area and the State of Missouri



Source: Missouri Department of Natural Resources, Division of Geology and Land Survey, 1986.

Figure 3.3.2-1 Surficial Geology of the Deployment Area

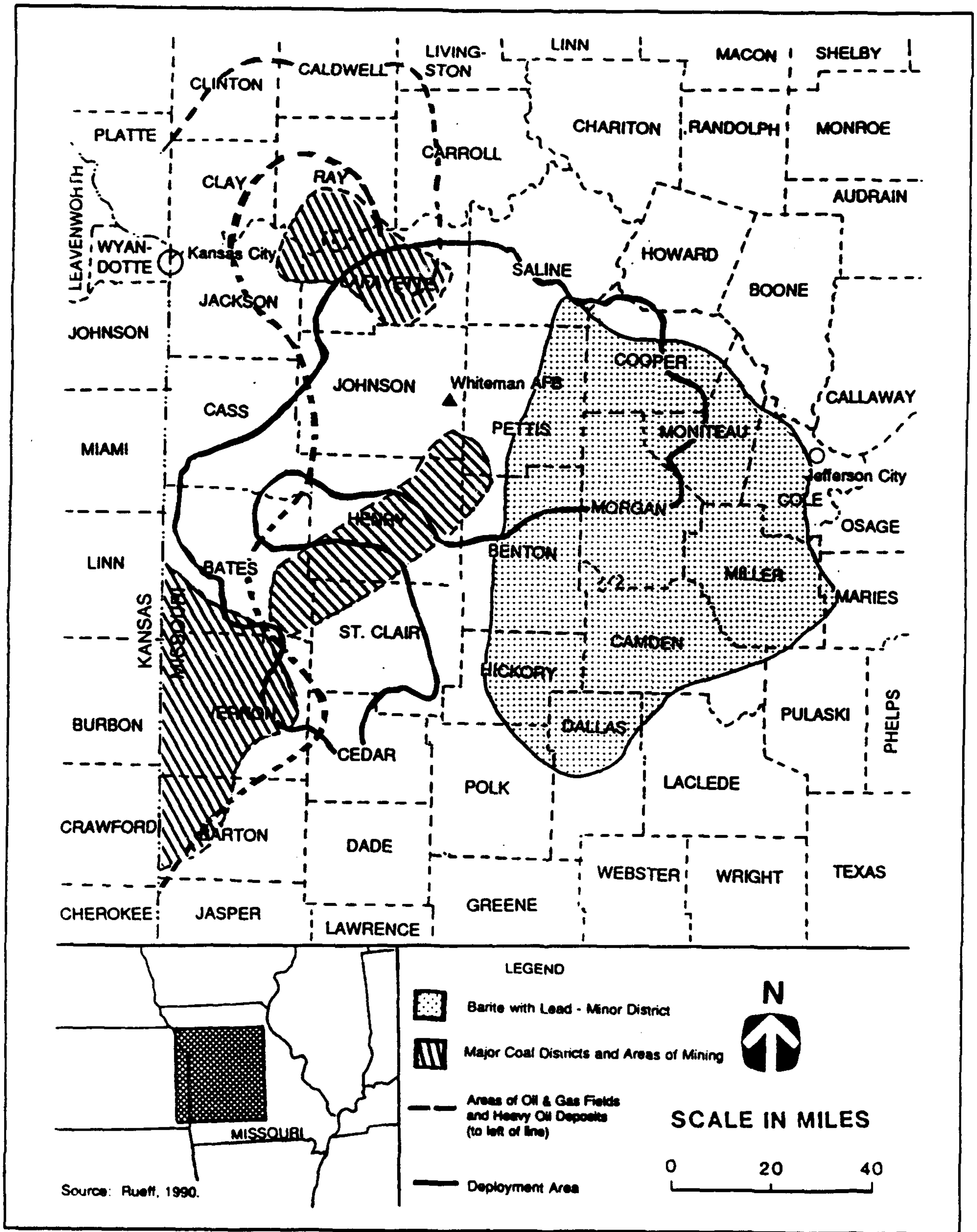


Figure 3.3.2-2 Mineral Resources of the Deployment Area

Only a few LFs or LCFs are near (less than 2 miles) oil or gas wells. LCF K-1 (in southeast Bates County) is located within 2 miles of two exploration holes used as water wells and a canceled (i.e., never drilled) or incomplete well. In central to north-central Bates County, K-6 is within one mile of six plugged (cement plugs) wells, K-8 is located within 2 miles of canceled and plugged wells; and K-11 is located within 2 miles of a shut-in well (drilled but not producing because of economics). In south-central Cass County, L-11 is located within 2 miles of a plugged well. Northwest Cedar County contains LFs H-1 and H-5, both of which are within 2 miles of a plugged well. Launch Facility J-7 is in northeast Vernon County and is located within 2 miles of a plugged well (MDNR, 1992b).

Some of the energy resources in the deployment area are transported by means of underground (about five feet in depth) pipelines that pump the resource to a commercial vendor. Pipelines and their locations include: a natural gas pipeline running through Bates, Cooper, and Johnson Counties; two natural gas pipelines transversing Pettis County; a crude oil pipeline extending through Benton, Morgan, and Saline Counties; and two crude oil pipelines, both running through Johnson and Lafayette Counties (MDNR 1982, 1988). A pipeline is located 2,500 feet south of B-5, 3,800 feet north of B-6, 4,500 feet north of B-8, and 1,900 feet north of O-10.

The mineralized Pennsylvanian rocks of the deployment area may contain localized, nonproducing lead and zinc deposits. Minor occurrences of metals are found in the deployment area and there have been localized prospect pits dug by past mining operations. Minor quantities of lead and zinc have been recovered in the deployment areas of Benton, Cooper (which has an open-pit mine), Moniteau, Morgan, and Pettis Counties (MDNR, 1982, 1988).

Portions of Morgan and Moniteau Counties contain barite accumulations in sinkholes and solution features. These deposits have been sporadically mined within the deployment area (USAF, 1986). Only one area of barite deposits, within southeastern Cooper and Pettis Counties, is currently being mined (Rueff, 1992). There is a small potential for further barite mining within the deployment area. Barite is often mined in association with lead and may be found in replacement veins and cavities within limestone and dolomite (karst-type residual deposits; the term "karst" defines areas in which water-soluble rock has been dissolved) (Prinz et al., 1978).

Large coal reserves are located in the southwestern and northern portions of the deployment area (Rueff, 1990). Coal-bearing strata extend throughout Bates, Cass, Johnson, Lafayette, and Vernon Counties, and are partially beneath Benton, Cedar, Cooper, Henry, Pettis, St. Clair, and Saline Counties. Moniteau and Morgan Counties are not underlain by coal-bearing strata (MDNR, 1982, 1988). During 1990, the six active mines in the state produced nearly 2.6 million tons of coal. As of January 1992, only five active coal mines (all of which are surface mines within Randolph, Monroe, Vernon, Bates, and Barton Counties) are in operation in Missouri (MDNR, 1992). Henry and Bates Counties were heavy coal-producing areas, and past mining operations were

located in the deployment area within Bates, Benton, Cooper, Henry, Johnson, Lafayette, Pettis, and St. Clair Counties.

The majority of the coal in Missouri has a high sulfur content and is minimally mined because of the competition from low-sulfur coal mined in the Western United States, primarily Wyoming. Most coal users in Missouri have changed their supply from local to western coal. Only a few small coal companies operate in Missouri, and they supply coal to local markets. Underground mining was the main method of the early coal development (prior to the 1930s). Underground mining within the deployment area was not very extensive, but there are many mine shafts found further south in the tri-state mining area near Joplin, Missouri (Rueff, 1992a).

After technology developed methods to cost-effectively remove overburden, surface mining became the dominant recovery method for coal in Missouri and had almost completely replaced underground production by the 1960s (Robertson, 1984). Many early operations consisted of following a coal seam from the surface to a depth of 100 feet in the relatively flat areas of Bates and Vernon Counties (Rueff, 1992a).

In the early 1970s, the State of Missouri passed a law that required reclamation of all mining operations. All mining operations closed before that date were exempt from the law. Reclamation efforts were performed on many of the large surface mines prior to the State's enactment of the law. Old prospect pits and mine shafts still exist within the deployment area; some are located within 1 mile of MM II LFs, as referenced in appendix F. Coal shafts are to the east of J-3 and to the west of J-8, and large coal mines are about 3 to 5 miles west of K-10 (Rueff, 1992).

Carbonate rock quarry areas are located in areas of Bates, Cass, Cooper, Henry, Johnson, Saline, and Vernon Counties (MDNR, 1982, 1988). Limestone is readily available within the deployment area, primarily from quarries in the northern and western areas, for use as fill or for road material (Rueff, 1992a).

Abun: nt and high-quality resources of clay and shale are located within portions of the deplo ent area. The clay was used primarily in the manufacture of bricks, but the brick industry in Missouri has shifted to other states, although a few small manufacturers still exist outside of the deployment area. The old clay industry within the deployment area was centered in Henry County and was closed down by the 1930s. These clay pits have since filled with water (Rueff, 1992a).

3.3.3 Soils

Soils in the deployment area are primarily of two soil orders: Mollisols, derived from prairie vegetation; and Alfisols, derived from forest vegetation. These soil orders, referenced in appendix F, are subdivided into 28 soil associations and approximately 50 soil series. Most of these soils have a silt loam texture.

Table 3.3.3-1. Soil Types and Properties

Soil Series, depth		Shrink-swell Potential	Permeability	Surface Runoff	Erosion Hazard	Depth to seasonal water table, time
Barco loam,	0-13" 13-33"	Low Moderate	Moderately rapid Moderate	Medium to rapid	Moderate	greater than 6 ft
Barden silt loam,	0-11" 11-14" 14-23" 23-60"	Low Moderate High Moderate	Moderate Moderately slow Slow Moderately slow	Medium	Moderate to severe	2 - 3 feet, November through April
Deepwater silt loam,	0-10" 10-75"	Low Moderate	Moderate Moderate	Medium	Moderate to severe	3 - 4.5 ft, November through April
Haig silt loam,	0-7" 7-13" 13-38" 38-64"	Moderate High High High	Moderate Moderate Slow Moderately slow	Slow to medium	Moderate	0 - 3 ft, April through July
Hartwell silt loam,	0-7" 7-30" 30-60"	Low High Moderate	Moderately slow Slow Slow	Medium to rapid	Moderate to severe	0.5 - 1.5 ft, November through April
Higginsville silt loam,	0-10" 10-87"	Low Moderate	Moderate Slow	Medium	Severe	1.5 - 3 ft, November through April
Kenoma silt loam,	0-8" 8-60"	Low High	Moderately slow Very slow	Slow to medium	Severe	greater than 6 ft
Macksburg silt loam,	0-8" 8-94"	Moderate High	Moderate Moderately slow	Slow	Moderate	2 - 4 ft, April through July
Marshall silt loam,	0-13" 13-48" 48-103"	Low Moderate Low	Moderate Moderate Moderate	Medium	Moderate	greater than 6 ft
Sampsel silty clay loam,	0-10" 10-60"	Moderate High	Moderately slow Slow	Medium	Moderate to severe	0 - 1.5 ft, November through April

Source: Adapted from soil surveys of the following counties: Bates, 1990; Benton, 1989; Cass, 1985; Cooper Co. (unpublished); Henry, 1976; Howard, 1978; Lafayette, 1975; Johnson, 1980; Morgan Co. (unpublished); Moniteau, 1964; Pettis (unpublished); St. Clair, 1987; Vernon, 1977.

Permeability is the measure of the quantity of water that can move downward in a soil in a given time period; it is usually expressed in inches of water per hour. Terms describing permeability, in inches per hour, are: very slow (less than 0.06), slow (0.06 to 0.2), moderately slow (0.2 to 0.6), moderate (0.6 to 2.0), moderately rapid (2.0 to 6.0), and rapid (6.0 to 20.0). Most of the soils in the deployment area have slow to moderate permeability in the topsoil and slow to very slow permeability in the subsoil (table 3.3.3-1).

Surface runoff is the precipitation that flows off the land without infiltrating the soil. Runoff rates depend upon the slope, soil texture, vegetative cover, and the moisture content of the soil and are expressed in qualitative terms: slow, medium, and rapid. Runoff rates within the deployment area are generally slow to medium, with medium to high runoff in areas with steeper slopes. The slopes of the soils near the launch facilities vary from nearly level to approximately 10 percent, with most sites having a slope of between 2 and 5 percent. Given the texture, permeability, runoff characteristics, and slope of the soils, along with the relatively high annual precipitation, about 95 percent of the soils in the deployment area are moderately to highly susceptible to soil erosion by water, especially if disturbed. Soils with a severe hazard of erosion are found throughout the deployment area. Most of these soils have a moderate to high shrink-swell potential; their volume can vary 3 to 8 percent or more when conditions change from wet to dry. Many of these soils are affected by seasonally high perched water tables and remain wet for prolonged periods of time.

Soils in portions of the deployment area may be prone to minor slumping (sudden downgradient movement) problems when they become saturated with water. Bates, Cass, and Vernon Counties are underlain by shale, which, when saturated, may produce minor slumping problems. Areas of loess hills near the Missouri River in Lafayette and Saline Counties are known to incur minor slumping (Ponner, 1992).

To reduce soil erosion from agricultural activities, the State of Missouri has set up a program known as the Special Area Land Treatment (SALT) with local soil and water conservation districts to install soil conservation structures. This is a voluntary program in which the State offers incentives (cost-share and interest-share loans) to encourage landowners to apply erosion control measures such as terraces, waterways, water-impoundment structures, and grassland establishments to limit soil erosion (Boone, 1992). Within the deployment area, there are three projects in Pettis County, and one each in Bates, Benton, Cass, Johnson, Lafayette, and Saline Counties. There are 11 LFs and one LCF in or near SALT project areas.

3.3.4 Geologic Hazards

Geologic hazards in the deployment area include ground subsidence, sinkholes, and faults. Ground subsidence is attributable to limestone solution features and possibly abandoned underground mines, found in the western portion of the ROI. A sinkhole is a circular depression in the ground surface that occurs when the overburden collapses into a typically shallow mine void. The only karst areas found within the deployment

area are two localized sites located in northwest Cooper County (MDNR, 1986). In April of 1992 a large 112-foot-long, 32-foot-wide sinkhole was discovered in agricultural land near La Monte, Missouri. The Missouri Department of Natural Resources believes that this sinkhole is the result of fracturing of the limestone strata of the area and is an isolated incident (Groves, 1992). The majority of underground mining operations were undertaken to obtain coal, with some mineral prospects and limestone mines. A few underground limestone mines may still exist to the southeast of the deployment area in St. Clair, Henry, and Benton Counties (Rueff, 1992).

The deployment area is in a zone of low seismicity with only a few scattered epicenters (USAF, 1986). The resulting earthquakes were small in magnitude, with fault lengths of 0.5 to 1 km; mislocation of faults attributable to the earthquakes may be several kilometers. It is not possible to definitely connect epicenters with small geologic features. Consequently, these epicenters have not been related to faulting in this area (Robertson, 1991).

Most of the faults in the deployment area are believed to have been inactive during the Holocene (within the past 10,000 years). Although minimal work has been done to verify the activity of these faults, the probability is only very small of an earthquake with a body wave magnitude (on the Richter scale) greater than 4 occurring in the area (Robertson, 1991). A body wave magnitude of 4 or less would be felt indoors by most people but only by a few people outdoors; at this level, the impact would be similar to that of a heavily loaded truck moving nearby, causing creaking of structures such as walls and frames. A wave magnitude of greater than 4 would cause glassware to break, doors to rattle, and small objects to move.

Seismic zone maps reveal that the New Madrid Fault Zone is the greatest seismic threat to the area. Located in the central Mississippi Valley approximately 170 miles southeast of the deployment area, the New Madrid Seismic Zone is the most active seismic zone east of the Rocky Mountains. The New Madrid Seismic Zone is 200 miles long and 15 miles wide that produces about 150 earthquakes a year. The inhabitants of this area only notice about eight of these quakes (Metzger, 1986).

A series of earthquakes of magnitudes greater than 8.0 on the Richter Scale occurred along the New Madrid Seismic Zone in the winter of 1811-12. The potential for an earthquake (of magnitude 6.0 on the Richter Scale) to occur in the New Madrid Seismic Zone by the year 2000 is 40 to 63 percent; the probability increases to 86 to 97 percent by the year 2035. The damage to the deployment area caused by a New Madrid earthquake of greater than 8.0 on the Richter scale would range from slight damage (some instances of fallen plaster and toppled chimneys) to slight to moderate damage (slight to moderate damage in ordinary structures (i.e., chimneys broken)).

An earthquake would be unlikely to affect the LFs or LCFs. All of the underground structures in the LCFs and LFs are designed to survive the vibrations produced from a nearby nuclear detonation. The ground vibrations produced by an earthquake of 8.0 on the Richter scale would be significantly less than that of a nearby nuclear detonation.

3.4 WATER RESOURCES

3.4.1 Ground Water

3.4.1.1 Description

The MM II missile deployment area is located within the Central Midwest Regional Aquifer System. Ground water in this area of Missouri is found in aquifers composed of alluvium, glacial-drift deposits, and carbonates. Confining layers of low-permeability rock, predominantly shale interbedded with limestone and dolomite, separate the major aquifers of this region. The principal aquifers in the deployment area are in sedimentary bedrock usually at depths of greater than 100 feet and are confined (bounded between low permeability layers) (MDNR, 1986).

The hydrogeology of the deployment area can be characterized with the use of a cross-section, stratigraphic column, surficial geology map, and drill logs. Figure 3.4.1.1-1 portrays the general nature of the major aquifers in an east-west cross-section of the MM II deployment area in Missouri. This cross-section represents a reasonable picture of the aquifers in the deployment area. Table 3.4.1.1-1 shows an idealized stratigraphic column and identifies the hydrologic units within the deployment area (age of the formations increases with depth). Figure 3.3.2-1 (from the previous section) illustrates the surficial geology of western Missouri.

The relative depth of the aquifers described in table 3.4.1.1-1 varies throughout west central Missouri. The uppermost unit is Quaternary-age alluvium that forms an unconfined aquifer with yields of 30 to 100 gallons per minute (gal/min). These unconsolidated sand and gravel aquifers are typically 20 to 50 feet deep by major streams and 0 to 20 feet deep by stream tributaries (Miller and Vandike, 1992). The Pennsylvanian aquifer is shallow with rare outcrops in the western portion of the deployment area. The Pennsylvanian formations, in which the LCFs and LFs are typically anchored, are often less than 25 feet from the surface, but may occur at a depth reaching 720 feet in northwestern Bates County. Many of the LCFs and LFs are anchored in Pennsylvanian bedrock, which exists over much of the deployment area, particularly the western and souther portions. These sediments reach a thickness of 720 feet in northwestern Bates County. Where they exist, Pennsylvanian sediments are generally encountered at depths of less than 25 feet. Generally, the Pennsylvanian aquifer is tapped at depths between 100 and 400 feet. Geologic units of the Mississippian aquifer occur near the surface in the central portion of the deployment area and are up to 400 feet thick in Bates and Vernon County. Stratigraphic units of the Mississippian aquifer are often tapped at depths between 100 and 400 feet. On the basis of drill logs, few LFs and LCFs are anchored in units of the Cambrian-Ordovician aquifer. Cambrian-Ordovician units are near the surface in the eastern portion of the deployment area and may be as thick as 1,000 feet in Bates and Vernon Counties (Kleeschulte et al., 1985). Stratigraphic units of the Cambrian-Ordovician aquifer are often tapped at depths between 200 and 1,700 feet (MDNR, 1964 and USGS, 1985).

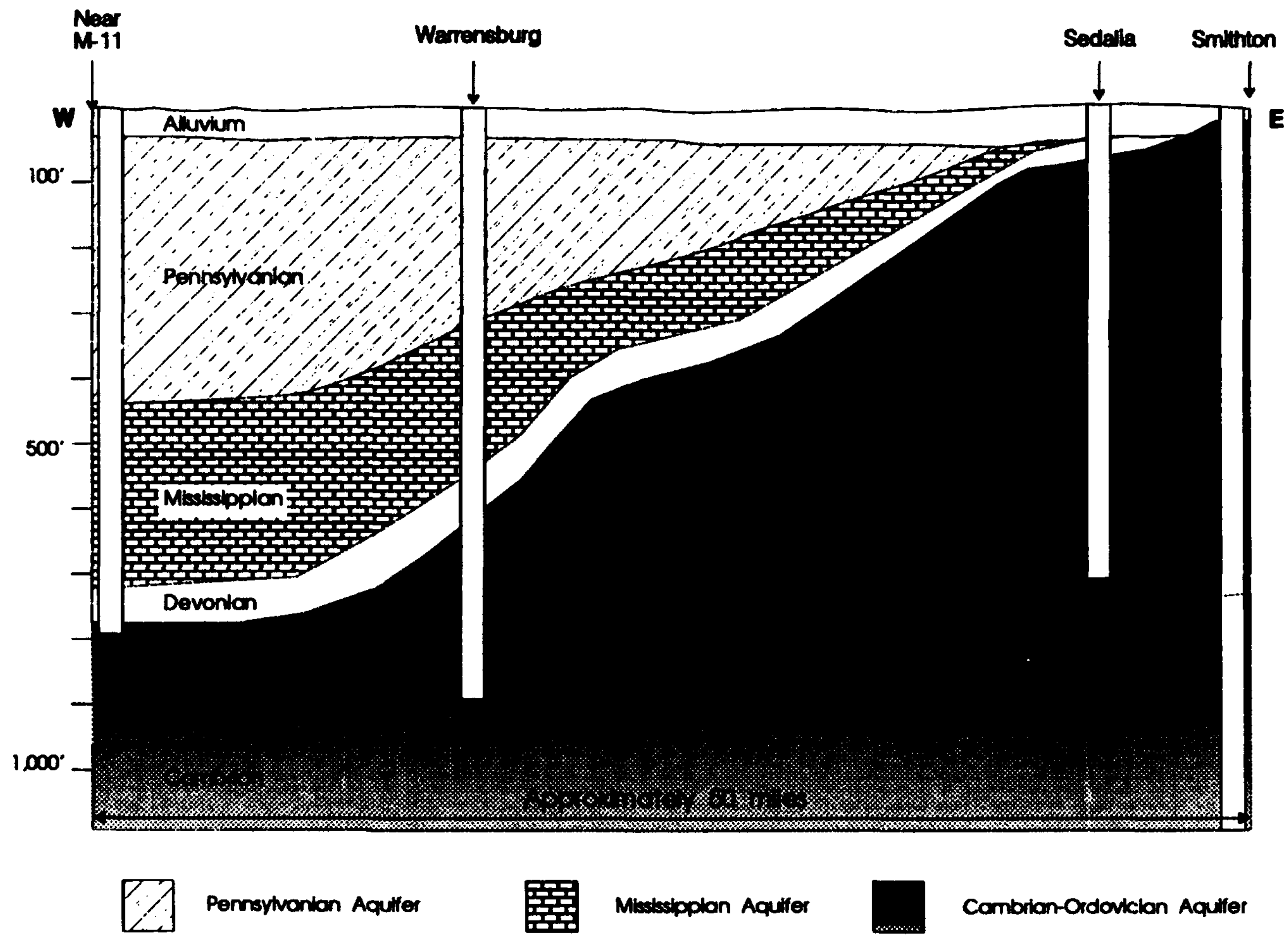


Figure 3.4.1.1-1 Cross-Section Based on Private and Public Wells Along Route 50

Table 3.4.1.1-1. Bed Rock Formations and Aquifers in the Deployment Area

Era	System	Series	Geologic Unit	Hydrologic Unit	Water-Bearing Characteristics
Cenozoic	Quaternary	Holocene	Alluvium	Unconfined aquifer.	Yields of 30-100 gpm.
Paleozoic	Pennsylvanian	Missourian	Kansas City Group Undifferentiated	Primarily a confined aquifer.	Yields may range from less than 1 gpm to 40 gpm locally. Domestic and stock use.
			Pleasanton Group Undifferentiated		
		Desmoinesian	Marmaton Group Undifferentiated		
			Cherokee Group Undifferentiated		
	Mississippian	Meramecian	Warsaw Formation	Primarily a confined aquifer.	Yields little water.
		Osagean	Keokuk and Burlington Limestones		Average yield of 15-20 gpm. Brecciated areas and solution openings may yield up to 60 gpm locally. Domestic and stock use.
			Elsey Formation		
			Reeds Spring Formation		
			Pierson Formation		Yields very small quantities of water.
		Kinderhookian	Northview Formation	Confining bed.	
			Sedalia and Compton Formations Undifferentiated	Confining bed.	Yields small quantities of water.
	Devonian	Upper	Chattanooga Shale	Confining bed.	
	Ordovician	Lower	Cotter and Jefferson City Dolomites	Confined except where near land surface.	Small yields of water.
			Roubidoux Formation		Yields of 50-75 gpm in upper 50 to 75 feet. Yields of [illegible] gpm in wells that completely penetrate the formation
			Gasconade Dolomite		Upper Gasconade yields 250-600 gpm. Lower Gasconade yields 350-1000 gpm.
	Cambrian	Upper	Eminence and Potosi Dolomites		Yields 500 to 1200 gpm.
			Derby-Doerun Dolomite and Davis Formations Undifferentiated	May be a confining bed.	Yields small quantities of water.
			Regan Sandstone	May be a confining bed.	Yields vary considerably.
	Precambrian		Metasedimentary rocks, granite, gneissic granites and rhyolites		Base of hydrologic system; generally does not yield water.

Sources: Kleeschulte, et al., 1985; and Gentile, 1976.

Recharge, movement, and discharge of ground water in a river basin (such as the Osage River Basin, in which half of the deployment area is situated) depends upon the complex relationship between the topography, amount of weathering, regional stratigraphy, and structural deformation of the geology. The principal means of recharge in upland areas of the deployment area is by infiltration of precipitation into residual materials and then by diffuse recharge into the bedrock aquifers (MDNR, 1992b). The recharge through outcrops of some of the deeper formations varies markedly. Recharge in the deeper aquifers results from lateral movement, but isolated cases of vertical recharge occur in the deeper aquifers (leakage from Mississippian through Ordovician-Cambrian) (Miller and Vandike, 1992). The low-permeability Pennsylvanian strata impede the ground water from lateral or vertical movement and do not allow much opportunity for recharge or discharge (USGS, 1967). Fractured Pennsylvanian rock, such as limestone or sandstone outcrops, allow diffuse recharge into the aquifer. However, most precipitation quickly runs off of these rocks, and recharge occurs at a very slow rate through fractures or joints. The Pennsylvanian aquifer contains thick layers of shale and serves as a leaky confining bed to the underlying Mississippian aquifer (a confined aquifer). The Cambrian-Ordovician aquifers can be characterized as leaky artesian or semi-confined (Kleeschulte, et al. 1985).

The LFs and LCFs are located within confining formations, deep aquifer recharge areas, and unconfined aquifers. In the deployment area, 116 out of the 165 facilities are located in Pennsylvanian strata (table 3.4.1.1-2). The letters A through O are used for row headings in table 3.4.1.1-2 to designate the LCF and LF groupings, and the numerical column headings 1 through 11 denote the sequence within each grouping. Thirty-two of the LCFs and LFs are located in Mississippian strata. The Mississippian aquifer is subject to much more rapid recharge than is the Pennsylvanian in the area of the Springfield Plateau (figure 3.3.1-1, previous section), primarily as a result of the development of underground drainage (solution cavities). LFs A-11 and B-11 are located in high recharge areas composed of valley fill and alluvium. One of the facilities is located in Devonian strata. Fourteen of the facilities in the southeast region of the deployment area are located in a high recharge zone in Ordovician strata.

The Ozark Plateau, which extends throughout southeastern Missouri (figure 3.3.1-1, previous section), is comprised of Cambrian and Ordovician carbonates and is characterized by a rapid interchange of surface water and ground water, principally at near-surface or surface outcrops of the fractured limestones and dolomites. The Ozark Plateau contains many springs with locally well-developed areas of karst topography formed by intense weathering (USGS, 1986). However, there are no major karst areas within the development area because the degree of erosion decreases radially from the Ozark Mountains (Miller and Vandike, 1992).

Perched aquifers (a discontinuous saturated lens with unsaturated conditions above and below it) are common in Pennsylvanian and Mississippian rocks. Excluding perched aquifers, the water table in the deployment area is usually below 120 feet. The confining layers cause artesian conditions in the aquifers, but the conditions are not sufficient to cause flowing wells.

Table 3.4.1.1-2
Underlying Uppermost Geologic Formation at Each Launch Facility and Launch Control Facility in the Deployment Area

	1	2	3	4	5	6	7	8	9	10	11
A	Pm	Pcc(?)	Pm	Pcc	Pcc	Pcc	Pm	Pcc	Pm	Pm	Q
B	Pck	Mo	Mo	P(Ls)	Mo	Mo	Mo	Mo	Pck	Pr(?)	S
C	Mo	Mw	Mw	Mo	Mo	Mc	Dc	Mc	Mc	Mo	Mw
D	Oc(?)	Mo(?)	Mo	Mo(?)	Oc(?)	Oc(?)	Oc(?)	Oc(?)	Oc(?)	Oc(?)	Oc(?)
E	Oc(?)	Oc(?)	Oc(?)	Oc(?)	Mo(?)	Mo(?)	Mo(?)	P(sink)	Pcc(?)	P(ss)	Pcc(?)
F	Pck	Mc	Oc(?)	Oc(?)	P(ss)	Mc	Mo	Pck(?)	Pck(?)	Pcc	Mo(?)
G	Pck	Pck(?)	P(chert)	Pck(?)	P(ss)	Mo	P(ss)	Mc	Pck(?)	Pcc	Pcc
H	Mw	Pck(?)	Pck	Pck	Pck(?)	Mw	Pck	Pck	Pck(?)	Pck	Pck
I	Pm	Pm	Pm	Pcc	Pcc	Pcc(?)	Pcc	Pcc	Pcc	Pm	Pm
J	Pcc(?)	Pm	Pcc	Pck	Pck	Mc	Pck	Pck	Pcc	Pm	Pm(?)
K	Ppf	Pm	Ppf	Ppf	Pm	Pcc	Pm(?)	Pc(?)	Pm	Pm	Pm(?)
L	Pm	Pm	Pm	Pcc	Pm	Pm	Pm	Pm	Pm	Pb	Ppf
M	Pm	Pcc(?)	Ppf	Pm	Ppf	Pm	Pp	Ppf	Pm	Pm	Pm
N	Pm	Ppf	Ppf	Pm(?)	Pm(?)	Pm	Pm	Ppf	Pm	Pm	Pm(?)
O	Pcc	Pc	Pcc(?)	Pc	Ppf(?)	Mo(?)	Ppf(?)	Pcc	Pcc	Pcc(?)	Pcc

Formation Abbreviation	Number of Sites	Formation Description
S	1	Overburden and clay to 100 feet
Q	1	Pleistocene drift or valley fill
Psink	1	Pennsylvanian sink filling
P(chert), P(ss) or P(Ls)	6	Pennsylvanian (chert, sandstone (ss), or limestone (Ls))
Pb	1	Kansas City Group Bronson Subgroup
Ppf	12	Channel fill sandstone probably of Pleasanton Age
Pp	1	Pleasanton Group
Pm	41	Marmaton Group
Pc	3	Cherokee Group (Undifferentiated)
Pcc	28	Cherokee Group Cabaniss Subgroup
Pck	22	Cherokee Group Kreps Subgroup
Pr	1	Riverton Formation
Mw	5	Warsaw Formation
Mo	20	Osagean Series
Mc	7	Chouteau Group
Dc	1	Callaway Formation
Oc	14	Ordovician Canadian series
TOTAL	165	

(Note: "(?)" indicates uncertainty of group or formation on well logs or geologic map).

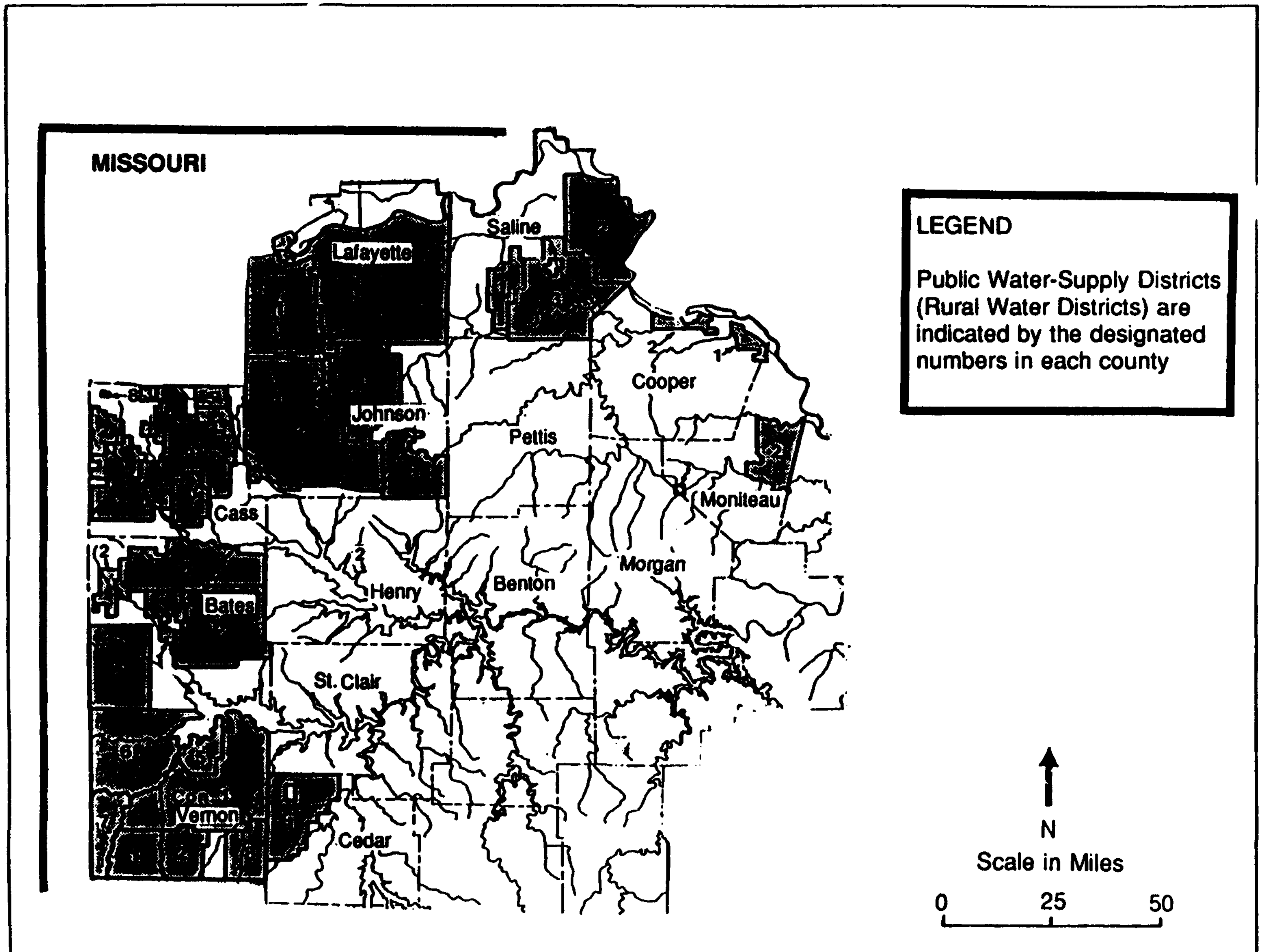
Source: U.S. Air Force 1963, 1963a, 1963b, 1963c; and MDNR, 1964.

The regional movement of the ground water in the confined aquifers in the deployment area is generally in the north-northwest direction. The topography controls the movement of the shallow ground-water in the unconfined alluvial aquifers. Seasonal water table fluctuations of 8 to 10 feet can occur. Instances of ground-water depression have persisted in portions of Bates County, but otherwise the ground-water levels in the deployment area have not declined appreciably in recorded history.

In the western portion of the deployment area, the Pennsylvanian aquifer is the primary ground-water source for agricultural and domestic use. Studies have shown that the Pennsylvanian aquifer's ground-water table corresponds to the surface topography. In the 1960s, the large growth of irrigation for agriculture use in the central and western portion of the deployment area produced the most recent significant decline in the Mississippian aquifer. Although there have been significant water level declines near municipalities and large groupings of production wells, the Mississippian aquifer within the deployment area has not undergone a substantial regional water level decline since 1960 (COE, 1989). In the eastern portion of the deployment area, the underlying Cambrian-Ordovician aquifers produce water for irrigation, municipal, and industrial uses. As the freshwater/mineralized water contact zone is approached from the southeast (see section 3.4.1.2), the domestic use of ground water decreases and reliance on the public water supply districts increases (Miller and Vandike, 1992).

As of 1986, Missouri had 217 Public Water Supply Districts (PWSDs). Thirty-six of these are located within the deployment area (figure 3.4.1.1-2). PWSDs are sometimes called rural water systems. The boundary of the PWSDs does not indicate the entire area of a district, but the area authorized for development. The 36 PWSDs are located in parts of Bates (6), Cass (9), Cedar (1), Cooper (2), Henry (1), Johnson (3), Lafayette (2), Moniteau (2), Saline (3), and Vernon (7) Counties (table 3.4.1.1-3). Benton, Morgan, Pettis, and St. Clair Counties do not have PWSDs. PWSDs are found in three types of regions. The first type are areas where urbanization has spread beyond city limits and the reach of municipal water supplies. The second type are found in portions of the Ozarks where larger resort and retirement establishments are located. The third type is in areas (typically northern Missouri) where surface water has a low sustained base flow and where the ground water tends to be unsuitable for use (MDNR, 1986).

Initially, each LCF relied on a well for potable water and extinguishing fires. The 15 wells ranged in depth from 100 to 800 feet; only 6 of these wells are still operational. Currently, the LCF water is derived from wells (B-1, C-1, D-1, E-1, F-1, and H-1), rural water supplies (H-1, K-1, N-1), hauled water (A-1, J-1, K-1, M-1, N-1), or an on-base connection (O-1). Most of the LCFs are located in areas with deep water tables. Each LCF contains two main water tanks: a day tank (which typically stores 300 to 7,200 gallons) and a tank for fire-fighting (which usually stores 1,700 to 7,050 gallons). Each LCF with a water well has a chlorination and water-softening unit to treat the well water. Rural water supplies are treated with chlorine gas and lime before delivery. Water quality tests for residual chlorine are done at least daily.



Source: Missouri Department of Natural Resources, Division of Geology and Land Survey, 1986

Figure 3.4.1.1-2 Public Water Systems Within and Near the Deployment Area.

Table 3.4.1.1-3 Domestic Water Use for Counties Partly or Wholly In the Minuteman II Deployment Area of Missouri			
County	Population Using Public Water Supply	Population Using Private Wells	Percentage of Population Using Private Domestic Wells for Drinking Water
Bates	13,430	1,590	11
Benton	3,630	10,230	74
Cass	55,160	8,650	14
Cedar	6,630	5,460	45
Cooper	11,000	3,840	28
Henry	13,600	6,440	32
Johnson	42,050	460	1
Lafayette	29,050	2,060	7
Moniteau	7,400	4,900	40
Morgan	4,130	11,440	73
Pettis	27,730	7,710	22
St. Clair	2,790	5,760	67
Saline	20,040	3,480	15
Vernon	16,340	2,700	14
Source: USGS, 1991.			

3.4.1.2 Quality

The quality of ground water within the deployment area can be characterized by the description of LCF well water and local ground water. The elevations, well depths, water tables, and particular water quality measurements (when measured) for the 15 LCFs are listed in table 3.4.1.2-1. For the deployment area in general, table 3.4.1.2-2 lists the depth to aquifer, aquifer yield, particular water quality parameters, and aquifer type.

The pH (or hydrogen-ion activity) is a measure of the water's reactive properties. A pH value of less than 7 indicates that the water is acidic; a value of 7 means that the water is neutral; a value of greater than 7 means that the water is basic. Ground water in the deployment area tends to be slightly basic, in the pH range of 6.8 to 8.4.

All of the ground water within the deployment area is considered hard (Miller and Vandike, 1992). Water hardness is caused by the presence of dissolved calcium and magnesium. The U.S. Geological Survey (USGS) classifies water hardness (in milligrams

Table 3.4.1.2-1 Well and Water Quality Data[a] for Launch Control Facilities									
LCF	Aquifer Tapped	Grade Elev. (Ft MSL)	Bottom Elev. (Ft MSL)	W.L. Elev. (Ft MSL)	Well Depth (Ft MSL)	Depth to Ground Water (Ft)	Well Service Status	Total Hardness as $CaCO_3$ (mg/L)	pH
A-1	Mississippian	806.3	526.3	779.3	280.0	27.0	Out	NA	8.0
A-1	Mississippian	806.3	420.3	NA	386.0	NA	Out	NA	NA
B-1	Cambrian-Ordovician	811.5	373.5	769.5	438.0	42.0	In	NA	7.8
C-1	Cambrian-Ordovician	860.0	452.0	833.0	408.0	27.0	In	88	7.8
D-1	Cambrian-Ordovician	949.8	641.8	883.8	308.0	66.0	In	NA	8.0
E-1	Cambrian-Ordovician	932.5	612.5	878.5	320.0	54.0	In	NA	7.8
F-1	Cambrian-Ordovician	916.6	585.6	858.6	331.0	58.0	In	58	7.8
G-1	Pennsylvanian	824.4	649.4	813.4	175.0	1160	Out	NA	7.5
G-1	Pennsylvanian	824.4	NA	NA	NA	NA	Out	NA	NA
H-1	Mississippian	850.9	550.9	770.9	300	80.0	In	NA	8.0
I-1	Mississippian	912.2	469.2	905.2	443.0	7.0	Out	NA	NA
J-1	Mississippian	814.0	41460	791.0	400.0	23.0	Out	NA	7.5
K-1	Pennsylvanian	867.5	767.5	835.5	100.0	32.0	Out	NA	7.4
K-1	Cambrian-Ordovician	867.5	67.5	NA	800.0	NA	Out	NA	NA
L-1	Mississippian	882.3	489.3	860.3	393.0	22.0	Out	NA	7.7
L-1	NA	882.3	NA	NA	Grout filled	NA	Out	NA	NA
M-1	Pennsylvanian	857.3	535.3	840.3	322.0	17	Out	NA	7.6
N-1	NA	881.1	NA	849.1	Grout filled	32.0	Out	NA	7.5
N-1	NA	881.1	NA	NA	Grout filled	NA	Out	NA	NA
O-1	NA	845.4	NA	833.4	NA Base Water	12.0	Out	NA	NA

As of December 1991 only LCFs B-1, C-1, D-1, E-1, F-1, and H-1 have on-site wells. Rural water systems supply G-1, K-1, and M-1 and water is hauled to A-1, I-1, J-1, L-1, and N-1. LCF O-1 is connected to the base water system at Whiteman AFB, Missouri.

NA = Data not available
[a]Water quality data is from August 1991.

Sources: U.S. Army Corps of Engineers, 1989; U.S. Air Force, 1963a; U.S. Air Force, 1991.

Table 3.4.1.2-2 Well and Water Quality Data for the Major Aquifers in the Deployment Area

		Yield (gal/min)					
Aquifer Name or Type	Depth (ft) to Aquifer (Common Range)	Common Range	May Exceed	pH	TDS (mg/L) Common Range	Total Hardness as $CaCO_3$ (µS/cm) (Common Range)	Water Quality and Aquifer Type
Alluvial aquifers, major river valleys	80-100	100-1,000	2,500	NA	<300	NA	Hard. Unconfined to partly confined.
Glacial-drift aquifer	100-250	5-200	500	7.2-8.0	<500	200-1,000	Hard. Unconfined to confined.
Pennsylvanian aquifer (sandstone and limestone aquifers in rocks of Pennsylvanian age)	100-400	1-15	25	7.7-8.1	750-7,500 (May exceed 20,000)	40-1,100	Hard. Unconfined near surface; partly confined to confined at depth.
Mississippian aquifer	100-400	10-25	300	7.3-7.8	250-1,250 (Can exceed 10,000)	150-700	Hard. Moderately mineralized. Confined except where near land surface.
Cambrian-Ordovician aquifer (Ozark aquifer)	200-1,700	15-700	1,000	7.3-8.0	200-1,400	100-800	Hard. Confined.

NA = Data not available

Sources: USGS, 1985; USGS, 1974; USGS, 1987.

per liter (mg/L) of $CaCO_3$) as soft (0 to 60), moderately hard (61 to 120), hard (121 to 180), and very hard (more than 180).

Total dissolved solids (TDS) indicate the amount of minerals dissolved in the water. The USGS classification for TDS categorizes a value of less than 1,000 mg/L as fresh water, 1,000 to 3,000 mg/L as slightly saline (brackish), 3,000 to 10,000 mg/L as moderately saline, 10,000 to 35,000 mg/L as very saline, and more than 35,000 as briny (Van der Leeden et al., 1990).

Ground-water quality varies within the deployment area along a freshwater/saltwater transition zone (generally the contact between Mississippian and Pennsylvanian rocks), which extends through Cooper, Pettis, Johnson, Henry, St. Clair, Vernon, and Barton Counties (USGS, 1974). Ground water along the transition zone is naturally radioactive (USGS, 1986a). The line formed by this transition zone roughly divides the ground-water quality in the deployment area into two halves (figure 3.4.1.2-1). Within the deployment area, ground-water quality ranges from 300 mg/L TDS in the southeast to 20,000 mg/L TDS in the northwest. TDS concentrations in the aquifers of the freshwater zone within the deployment area range from 40 mg/L to greater than 1,100 mg/L. The more productive aquifers (glacial drift and alluvial aquifers, Pennsylvanian and Mississippian aquifers) north and west of this line are not considered potable because of high TDS (MDNR, 1990). The quality of the ground water in the Cambrian-Ordovician and Mississippian aquifers changes significantly near the transition zone, reflected by increased concentrations of chloride and sulfate (Miller and Vandike, 1992). The EPA recommends a secondary maximum contaminant level for TDS, a non-enforceable standard, of 500 mg/L (Van der Leeden, et al. 1990).

Saline water makes up about 40 percent of the ground water in the aquifer systems in the state of Missouri. National drinking water standards are greatly exceeded in concentrations of dissolved solids, chloride, sulfate, and other constituents found in this saline water (USGS, 1986a).

Heavy metals known to be present as part of the structures at the LFs and LCFs include mercury, cadmium, chromium, and lead (see section 3.7). A chemical database maintained by the Missouri Department of Natural Resources (DNR) was consulted for background water levels of these metals. Over 300 files of water supply systems (both ground and surface water) in the deployment area were evaluated for concentrations of lead, cadmium, chromium, and mercury. With the exception of eight lead analyses, all analyses showed that metals were well below the maximum contaminant levels (MCLs) prescribed by EPA. The MCLs for lead, cadmium, mercury, and chromium are 15, 10, 2.0, and 50 μg/L, respectively. Background concentrations of cadmium were all less than 2.5 μg/L, background concentrations of mercury were all less than 0.5 μg/L, and background concentrations of chromium were all less than 25 μg/L. Within the past 5 years, four wells with lead concentrations above the MCL were retested and then found to have levels below the MCL (Killion, 1992). Missouri DNR will test more wells, including the four wells with high lead levels, during the next several years. The four samples with high lead levels had concentrations of 36.0 μg/L, 18.0 μg/L, 15.0 μg/L and

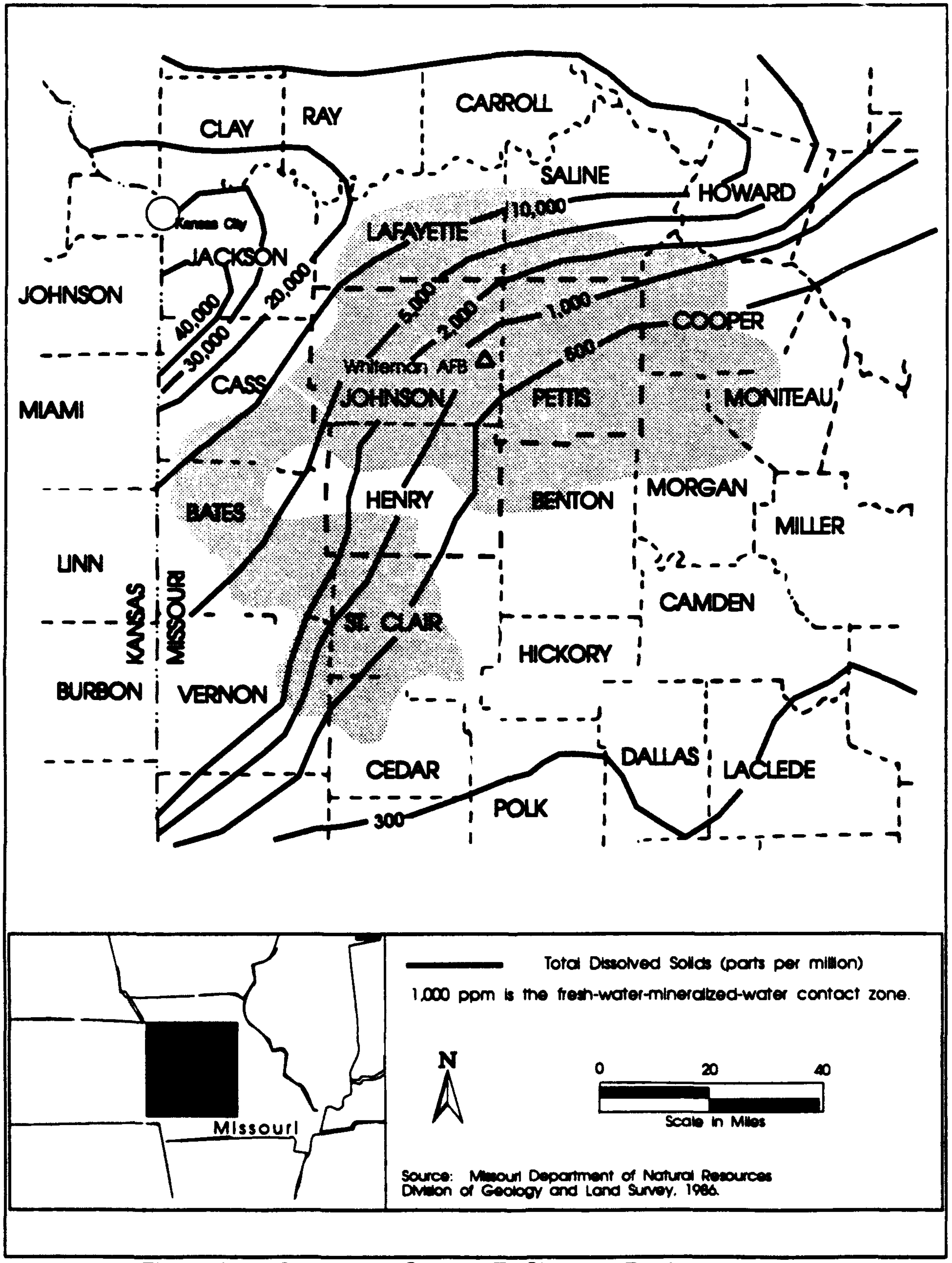


Figure 3.4.1.2-1 Water Quality (TDS) in the Deployment Area

15.0 µg/L). Further study revealed that the 36.0 µg/L was retested two months later and the new value was 5.0 µg/L. Also, one of the values given as 15.0 µg/L was found to be from a surface supply. Consequently, only two ground-water samples were at or above the MCL for lead.

A study of background concentrations of lead in municipal wells within five miles of an LF revealed that out of 46 wells, all but two have lead concentrations of less than 12 µg/L. These two wells are both in a different drainage gradients than the nearby LFs. One of the wells is one mile from an LF and five miles from another LF; the other well is two miles from an LF and four miles from another LF. Since the shallow ground-water gradient will normally follow the surface gradient, it is implausible that lead leaching from paint in an LF would migrate uphill and across to a different gradient.

The median and mode of these samples was calculated to be 5.0 µg/L and the mean was 7.2 µg/L. The calculated median and mode values are greater than actual levels because many concentration analyses were listed as "less than 10 parts per billion" or "less than 5 parts per billion", and were considered to be 10 parts per billion and 5 parts per billion, respectively.

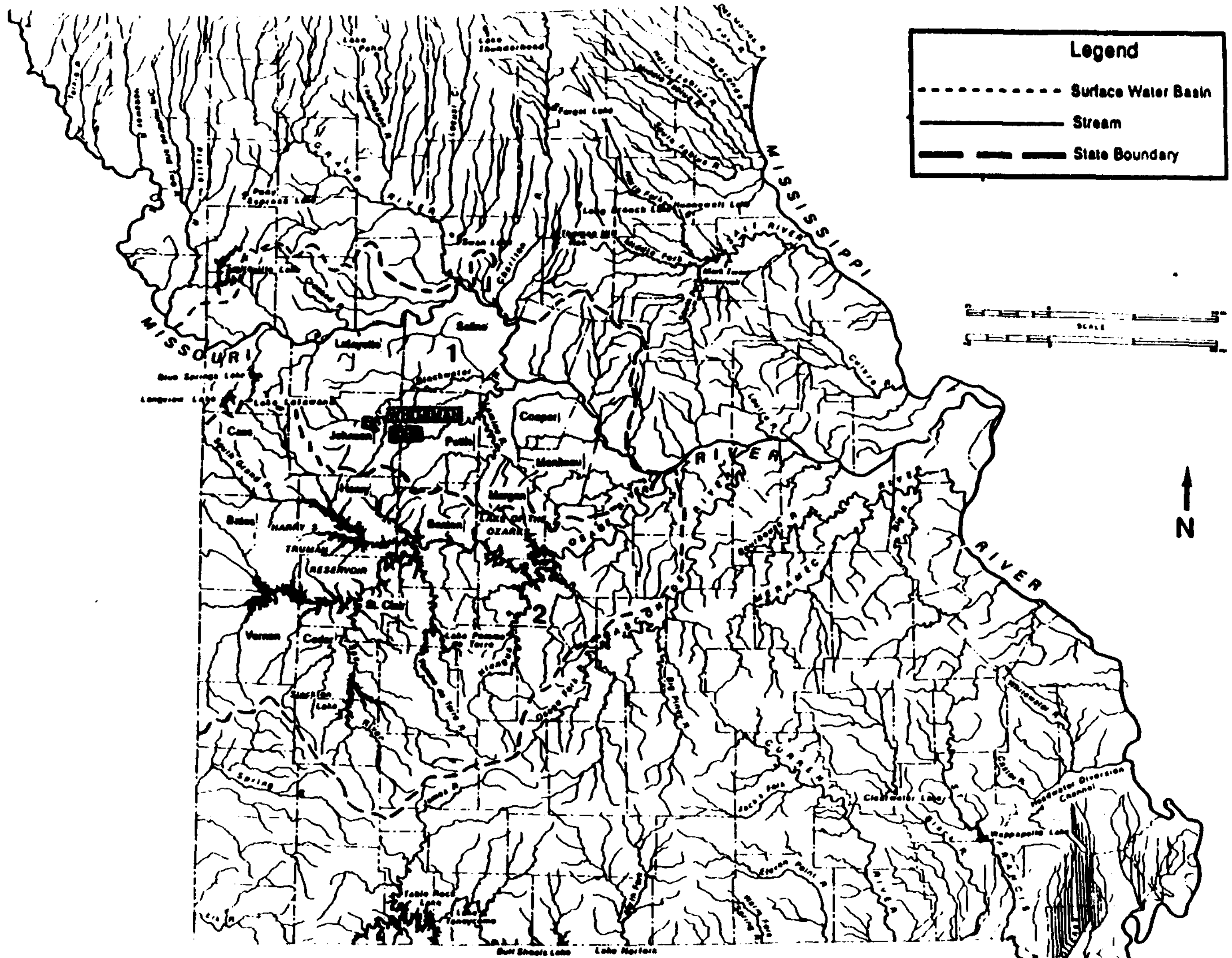
3.4.2 Surface Water

3.4.2.1 Description

The deployment area lies in the Missouri River Drainage Basin and the Gasconade-Osage Rivers Subregion. The principal watercourses in the deployment area include the Osage River, the Grand River, and the Harry S. Truman Reservoir. Part of the deployment area lies within the Lower Missouri-Blackwater-Lamine River Basin and the Osage River Basin (figure 3.4.2.1-1). Stream flow from tributaries feeding the main watercourses in the deployment area is predominantly perennial.

Stock ponds are abundant throughout the deployment area because of a Soil Conservation Service cost-share program for ponds, which, along with the poor quality the ground water and abundant rainfall in the region, leads to the proliferation of ese water reservoirs (Miller and Vandike, 1992). These impoundments vary in size from small ponds of less than an acre to tens of thousands of acres in the portion of the Harry S. Truman Reservoir that is within the deployment area. Some of the smaller impoundments are less than ¼ mile from a missile launcher (see appendix F). Average annual precipitation in the study area is about 36 inches per year, with maximum average monthly rainfall occurring during late spring, summer, and fall. Runoff in the area averages 8 to 9 inches per year (USGS, 1985).

Many communities in the deployment area rely on surface water reservoirs and PWSDs for their potable water. Harrisonville and Archie rely upon rivers and reserves stored in lakes to meet their water supplies. Appleton City relies upon the Henry County PWSD No. 2, and Blackburn on the Lafayette County PWSD No. 2. These public water systems largely use surface-water sources. Some of the PWSDs use both surface- and



1 Lower Missouri Blackwater-Lamine River Basin

2 Osage River Basin

Source: Missoun Department of Natural Resources, Division of Geology and Land Survey, 1986

Figure 3.4.2.1-1 Drainage and Major Waterways of the Deployment Area and the State of Missouri

ground-water sources, or only ground-water sources in areas of less-saline ground water. Sedalia uses water from a lake auxiliary, seven wells, and Flat Creek. Many of the larger towns also contain numerous mobile home courts, associations, and businesses that tap the local aquifer or surface-water supplies for their private water supply.

3.4.2.2 Quality

The major water quality concerns within and around the deployment area include pesticides and industrial chemicals, such as chlordane and polychlorinated biphenyls (PCBs) in the Missouri River (USGS, 1985). Although surface water quality is good, water quality problems in the South Grand River include acid mine drainage (MDNR, 1986). The Osage River Basin has been affected by such nonpoint sources as agricultural pollution and coal mining activities. Water from wastewater treatment plants is a concern in karst topography and around recreational areas (USGS, 1985).

The pH of the surface waters ranges from 7.0 to 8.6 and is slightly basic. Surface water supplies used for domestic purposes have a TDS concentration of 148 to 340 mg/L (MDNR, 1991).

Concentrations of the heavy metals of interest (see sections 3.4.1.2 and 3.7) were less than the MCLs (Department of Natural Resources, chemical master file, 1992). Background lead levels ranged from less than 5 µg/L to 10 µg/L. Background concentrations of cadmium were less than 5.0 µg/L. Chromium concentrations were less 1.0 µg/L, and mercury levels were less than 0.5 µg/L.

Recent results from water quality monitoring data by the USGS (January 1990) on two stations in the deployment area show the winter months representing the highest pH, TDS, and total hardness ($CaCO_3$) levels. The first station is located on the Osage River 3 miles northwest of Schell City, Missouri and the second station is located on the West Fork of Tebo Creek 2 miles southeast of Lewis, Missouri. The pH values are within 0.2 of each other (8.0 - 8.2), whereas the TDS readings ranged from 468 to 1,800 mg/L and the total hardness (as $CaCO_3$) ranged from 310 to 1,200 mg/L.

3.4.3 Whiteman AFB Water Quality

Applications for permits to discharge water are required and reviewed by both Federal and State agencies. The water permitting process ensures compliance with water pollution control regulations including the Clean Water Act and State permitting requirements.

Whiteman AFB has currently received Permits to Construct (which also include operational criteria) from the State of Missouri for the following sources: sewage treatment plant (permit No. MO 0029378), sewer to villages (permit No. 21-5701, NDPES No. 0109142), hydrant fuel system (permit No. 21-5833), FY90 modifications to the sewage treatment plant (permit No. 21-5880), vehicle wash facility (permit No. 21-5600), a permit to repair the trickling filter in the wastewater treatment plant, upgrade water

treatment plant (permit No. 1861-91 and 1515-89), water wells No. 9 and No. 10 (permit No. 1452-88, expired 09/13/90), water well No. 8 (permit No. 1466-88), water treatment plant (permit No. 1861-91), mission operations center (permit No. 1672-90), elevated water storage tank and clearwell FY90 (permit No. 1714-90), hydrant fuel system (permit No. 1713-90), and water treatment plant (permit No. 1861-91).

The SPTG/DEV manages the water permitting process at Whiteman AFB. Deactivation of the 508 MS, the 509 MS, and the 510 MS will not affect the need for the various water permits utilized by Whiteman AFB. The NPDES Permit is a Federal discharge permit and a State operating permit utilized by Whiteman AFB to allow the discharge of outfall water from the base waste water treatment facility. Whiteman AFB submits monthly monitoring reports for presentation to the State of Missouri to insure that no degradation of surface or ground water occurs in Johnson County.

3.5 BIOLOGICAL RESOURCES

3.5.1 Vegetation

Whiteman AFB and the missile deployment area lie within the eastern prairie-forest transition zone, a region of mixed prairie, savanna and forest. Missouri's location at the center of the continent and at a latitude of vegetative change from north to south provides variety in animal and plant life. This variety is due in part to the influences of both arctic and subtropical climates and also the change from grassland to woodland from west to east. The original grassland plains have largely been converted to grazing fields and cropland. Almost all of the upland forest, bottomland, and flatwood regions have been logged, cleared for grazing and cropland, or urbanized.

The prairie in the southern and western portions of the deployment area includes dominant tall grass prairie species, Indian grass (*Sorghastrum nutans*), little bluestem (*Andropogon scoparius*) and other characteristic species, including tickseed coreopsis (*Coreopsis grandiflora*), ragweed (*Ambrosia bidentata*), and goldenrod (*Solidago speciosa*). The remainder of the prairie in the deployment area is dominated by big bluestem (*Andropogon gerardii*), buffalo grass (*Buchloe dactyloides*), and prairie dropseed (*Sporobolus heterolepis*).

Forested land across the deployment area consists primarily of mixed oak (hickory, maple, cedar) upland dry forest. Characteristic species include shagberry hickory (*Carya ovata*), white oak (*Quercus alba*), and sugar maple (*Acer saccharum*). Understory species may include flowering dogwood (*Cornus florida*) and red mulberry (*Morus rubra*). Other plant species include spicebush (*Lindera benzoin*), redbud (*Cercis canadensis*), and Virginia creeper (*Parthenocissus quinquefolia*).

In addition to native prairie grassland and woodlands (26 percent), the deployment area consists primarily of grazing land (22 percent), and cropland (48 percent) occupied by introduced grasses and plant species. Dominant crops within the deployment area are soybeans and corn. Sorghum, wheat, and cotton are also grown.

3.5.2 Aquatic Resources

The Missouri River is the major surface water feature in the northern part of the deployment area, along with the Harry S. Truman Reservoir and the Lake of the Ozarks in the southern part of the deployment area. Livestock watering ponds, small streams, and tributaries of the major rivers in the region are common throughout the deployment area. Locations of surfacewater sources are referenced in appendix F. These aquatic habitats provide important recreational resources.

Many wetland resources in the region are generally threatened, if not rare, because of drainage, conversion for agricultural use, and logging. Historically, the state of Missouri had nearly 5 million wetland acres. According to current wetland delineation, approximately 640,000 acres of wetlands remain in Missouri. Assuming that the

wetlands are equally spread throughout Missouri, approximately 50,000 acres of wetlands would occur within the deployment area. Wetlands have distinct environmental quality values, such as oxygen production, nutrient recycling, flood control, and aquatic productivity. Common wetland vegetation consists of cattail (*Typha latifolia*), bulrush (*Scirpus rubricosus*), and American lotus (*Nelumbo lutea*).

3.5.3 Wildlife

The varied vegetation of the deployment area provides habitat for numerous wildlife species. Large animals include white-tailed deer (*Odocoileus virginianus*), black bears (*Ursus americanus*), gray foxes (*Urocyon cinereoargenteus*), and red foxes (*Vulpes fulva*). Smaller mammals include raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), eastern chipmunks (*Tamias striatus*), and gray squirrels (*Sciurus carolinensis*).

Birds prevalent are wild turkeys (*Meleagris gallopavo*), screech owls (*Otus asio*), downy woodpeckers (*Picoides pubescens*), and broad winged hawks (*Buteo platypterus*). Much of the deployment area is also suitable habitat for the greater prairie chicken (*Tympanuchus cupido*), a state-designated rare species that prefers to occupy open ground where visibility is extensive. The population of the prairie chicken has declined considerably from loss of undisturbed grassland habitat and it occasionally takes up residence on the Whiteman AFB flightline. Other upland prairie birds include the horned lark (*Eremophila alpestris*), the upland sandpiper (*Bartramia longicauda*), and the scissor-tailed flycatcher (*Tyrannus forficatus*). The wet prairies attract redwinged blackbirds (*Agelaius phoeniceus*), American bitterns (*Botaurus lentiginosus*), and sedge wrens (*Cistothorus platensis*).

Reptiles and amphibians are also common throughout the deployment area; these include the American toad (*Bufo americanus*), Western box turtle (*Terrapene ornata*), slender glass lizard (*Ophisaursus attenuatus*), and timber rattlesnake (*Crotalus horridus*). The redbelly snake (*Storeria occipitomaculata*), and northern cricket frog (*Acris crepitans*) are somewhat limited to wet prairies.

State-designated Natural Areas are located throughout the deployment area. As listed in section 3.2.2, these areas provide specific, protected habitat for much of the wildlife in the deployment area. Appendix F lists the existing wildlife refuges and parks located within 5 miles of an LF or LCF. In addition to the wildlife of the grasslands, domestic livestock (cattle, sheep, hogs, and horses) are prominent throughout the deployment area.

3.5.4 Threatened, Endangered, or Candidate Species

In accordance with Section 7(c) of the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS), and the Missouri Department of Conservation, were consulted concerning the presence of threatened or endangered species within the deployment area and within or near Whiteman AFB. Appendix G provides the correspondence to and from these agencies concerning the possible presence of and impacts to these species. The USFWS and the Missouri Department of Conservation identified several Federally

listed threatened, endangered, or candidate flora and fauna species that are known to occur, or are likely to occur, throughout the deployment area (table 3.5.4-1). A listed species, provided protection under the Endangered Species Act, is so designated because of danger of its extinction. The USFWS denotes the status of species that are candidates for listing as threatened and endangered by Category classification. A Category 1 candidate is a species about which sufficient information exists to support its being listed as threatened or endangered but for which the proposed rules for listing have not yet been issued. A Category 2 candidate is a species being considered for listing but information for which it is insufficient to merit listing. Category 3 includes species that were once considered for listing but are no longer being considered. Nearly all species listed as threatened or endangered at the State level are also listed at least as candidates at the Federal level.

Table 3.5.4-1
Federal-and State-Listed Threatened, Endangered, or Candidate Species

Scientific Name	Common Name	Status	Occurrence
FAUNA			
Etheostoma nianguae	Niangua darter	T,SE	3
Haliaeetus leucocephalus	Bald eagle	E,SE	2
Amblyopsis rosae	Ozark cavefish	T	4
Myotis grisescens	Gray bat	E,SE	4
Myotis sodalis	Indiana bat	E,SE	4
Falco peregrinus	Peregrine falcon	E	2
Lampsilis abrupta	Pink mucket	E,SE	4
Tympanuchus cupido	Greater prairie chicken	SR	2
FLORA			
Asclepias meadii	Mead's milkweed	T,SE	3
Geocarpon minimum	Geocarpon	T,SE	3

KEY
C1 = Category 1 candidate species
C2 = Category 2 candidate species
C3 = Category 3 candidate species
E = Endangered
T = Threatened
SR = State Rare
SE = State Endangered

1 = Known to occur on property
2 = Seasonal occurrence
3 = Occurrence probable
4 = Property is within species' range

Source: USFWS, 1992.

The bald eagle (*Haliaeetus leucocephalus*) and the peregrine falcon (*Falco peregrinus*) are migrants through the deployment area, with the bald eagle breeding along some of the major rivers in the state. The gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*) exist in scattered areas throughout the deployment areas, in limestone karst caves, and forage along riparian corridors. The aquatic fauna listed in table 3.5.4-1 are endemic to rivers, streams, and caves in the southwest corner of the state. The flora listed are known to exist in southwest counties in the state, specifically within natural prairies.

Although the species listed have the potential to exist within the deployment area, the LF and LCF sites are not conducive to plant growth because of the use of herbicides on the gravel ground cover and do not provide foraging or residential habitat to fauna. None of the species listed are known to occur on LF or LCF property. The USFWS indicated that no designated critical habitat occurs within the deployment area.

3.6 CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES

Cultural, archaeological, and paleontological resources would not be disturbed at the base as a result of implementing the proposed action or alternatives; therefore, this section describes the resources near or within the deployment area.

3.6.1 Cultural and Archaeological Resources

Cultural and archaeological surveys of the area around Whiteman AFB have primarily been done near the Blackwater-Lamine River Basin, which includes parts of the deployment area. Prehistoric use of this area was intensive and somewhat permanent, leading to the formation of deeply stratified sites. Prehistoric resources recorded include small woodland camps and remains, including ceramic shards. Recorded historic resources include homesteads, farmsteads, and related sites (USAF, 1990). The potential exists for unrecorded archaeological sites, especially near the Blackwater-Lamine Basin.

Informal consultation with the State Historic Preservation Officer (SHPO) of Missouri was performed according to Section 106 requirements of the Historic Preservation Act. Correspondence from the SHPO is included in appendix G. Historic and architectural sites that are listed or eligible for listing in the National Register of Historic Places (NRHP) exist in or near the deployment area. These NRHP-listed sites include the Lexington Battlefield in Lafayette County, Arrow Rock in Saline County, and Coal Pit Archaeological Site in Vernon County. Old dairy and agricultural communities of Cooper, Lafayette, and Pettis Counties are listed as historic districts. None of the sites listed exist on Air Force property. The historic sites within the deployment area may be near LFs or LCFs; however, the sites that are occupied or have the potential to be occupied, would be at least 1,200 feet from an LF because of initial placement restrictions for explosive safety. Any unnamed sites are not likely to be found near LFs or LCFs because historic and archaeological sites usually occur near major surface water features. The locations for LFs and LCFs were chosen to be on relatively flat ground away from water courses. The location of NRHP-listed sites and structures in relation to LFs and LCFs are listed in appendix F. Twenty-eight LFs or LCFs are located within 5 miles of NRHP listed sites. Because the exact location of some archeological sites is not public knowledge, the distance of these sites from an LF or LCF is given as a range.

Native American resources of the deployment area are, and have the potential to be, found in areas that were primarily inhabited by native tribes that lived in the Missouri river complexes for more than 12,000 years. These resources include Native American tribal villages, as well as ceremonial areas and burial grounds. Agricultural and hunting tools, food utensils, and ornaments of tribal representation have been found at these sites. The tribes located in western and central Missouri retained their territory until the first quarter of the nineteenth century (Chapman, 1983).

3.6.2 Paleontological Resources

The great variation in conditions during the Pennsylvanian Period (225 million years ago) of the Paleozoic Era contributed to the abundance of limestone-containing fossils representing the life of the Pennsylvanian oceans. The Pennsylvanian rocks are extensive in west-central Missouri and can be found in most of the deployment area. Nearly all the counties in the deployment area are considered primary fossil-collecting counties in Missouri (Unklesbay, 1973).

The best area for fossils from the Pleistocene Epoch (1 million years ago) is in the center of the state, including two counties located within the deployment area. Just 4.5 miles from Sedalia, in Pettis County, the swampy land on Flat Creek has yielded mastodon bones. In Moniteau County, fossils of turtles, a sloth, a tapir, and a mastodon were located in a large sinkhole called Sullen Mines. The most common examples of fossils found within the deployment area represent the Phylum Brachiopoda and the Phylum Mollusca (Unklesbay, 1973). These marine and freshwater invertebrates typically possessed an external skeleton in the form of a shell, which was preserved to create a fossil.

3.7 HEALTH AND SAFETY/HAZARDOUS MATERIALS/SOLID WASTES

This resource category addresses issues that may pose a threat or danger to the safety, health, and well-being of the general public. This includes the handling, storage, and disposal of hazardous materials/wastes; the handling and storage of nuclear materials; explosives safety; and transportation accident potential. Solid wastes and underground storage tanks are also discussed in this section. Potential effects to health and safety related to air quality and noise are discussed separately in sections 3.2 and 3.8, respectively.

The Air Force has formal safety programs addressing missile logistics that provide detailed safety requirements, training, and a mandatory reporting system for identifying and preventing safety-related problems. Weapons Safety (351 MW/SEW), Ground Safety (351 MW/SEG), and Bioenvironmental Engineering (351 Medical Group/SGPB) help institute and maintain health and safety programs at Whiteman AFB. Missile facilities are regularly inspected to ensure compliance with rigid safety criteria.

3.7.1 Transportation and Handling Safety

Safety provisions are incorporated into all aspects of missile maintenance and transportation. The Air Force has a long record of safe handling and maintenance of missiles. Approximately 500,000 road miles have been driven by transporter-erectors (TEs) carrying MM missiles (I, II, and III) between the deployment bases and launch facilities. In roughly 30 years, only six rollover accidents have occurred, with none involving propellant ignition. Approximately 18,000 trips per year, of which less than 2 percent are TE and reentry vehicle guidance and control (RV/G&C) van trips, originate from the MSB to the deployment area and back, excluding security police trips. The amount and type of accidents involved in transporting personnel and equipment to and from the deployment area are discussed in section 3.9; there have been no recent serious accidents involving either TEs or RV/G&C vans. If any serious accidents had occurred, an investigation would have followed and, if necessary, the handling and transportation procedures would have been modified to decrease the probability and severity of future accidents.

The probability of an accidental explosive detonation at an LF is infinitesimal. Quantity distance arcs for safety from accidental detonation of explosives have been established for the deployment facilities. A distance of 1,200 feet from the LF was designed to preclude structures from this safety zone. However, as discussed in section 2.2.3 and 2.2.4, there has been encroachment by some occupied dwellings. Approximately 200 homes, some in Blackburn and Syracuse, are less than ¼ mile from an LF. Launch facilities are also located less than ¼ mile from medium duty highways, and one LF is within ¼ mile of Interstate 70.

Ballistic gas generators are considered explosive devices and exist at each LF to rapidly open the launcher closure door during a missile launch. No detonations through handling of these devices have occurred at an Air Force missile base.

The RV continuously emits ionizing radiation in the form of alpha and beta particles, gamma rays, and X-rays at a very low rate (approximately 1 millirem (mrem) per hour), as measured at a distance of 3 feet from the RV. For comparative purposes, the natural background radiation from cosmic sources (the sun and radiation produced by charged particles reacting with the atmosphere), terrestrial sources (radioactive particles within the soil and rocks), and ingested particles from drinking water and the atmosphere is approximately 300 mrem per year (NCRP, 1987). The radiation from the RV would be undetectable at a distance of 10 feet, thus, the steel liner of the LF would not be irradiated to any significant degree as a result of the RV being in the launch tube. The steel liner of the LF would receive more radiation from naturally occurring radioisotopes within the soil and concrete (about 28 mrem) than from the RV (undetectable amounts) (HQ SAC/LGWR, 1992).

The Air Force has instituted a rigorous training program for persons who handle the various components of the MM II missiles. As discussed in section 3.9, the number of transportation mishaps is negligible relative to the number of miles driven. The accident rate per hour for personal injuries involving maintenance of the missiles is also negligible.

3.7.2 Hazardous Materials/Wastes

A hazardous material is any material that can cause damage to human health or the environment. When a hazardous material is spilled, spent, or contaminated to the extent that it is not able to be used anymore for its original purpose, or cannot be converted to a usable product, it becomes a hazardous waste. The fundamental legislation governing hazardous wastes is the Resource Conservation and Recovery Act (RCRA) and its amendments, and the regulations governing hazardous wastes are contained in 40 CFR 261 through 265, issued by the EPA and the Missouri Hazardous Waste Management Rules (10 CSR 25, Chapters 1-13). RCRA imposes design and operating standards to ensure that hazardous wastes are managed properly to prevent future uncontrolled situations. The regulations specify requirements for identifying, classifying, generating, transporting, tracking, storing, treating, disposing, or otherwise managing hazardous wastes. According to RCRA, a hazardous waste is a solid waste that is specifically listed as a hazardous waste in 40 CFR 261.30 through 261.33 or that exhibits a characteristic of hazardous waste (ignitability, corrosivity, reactivity, or toxicity) as determined by prescribed analytical procedures.

Hazardous wastes are generated at the deployment area facilities (e.g., spent sodium chromate solution, rags used to handle the solution, and rags or gloves used to handle polychlorinated biphenyls (PCBs)) and the on-base maintenance complex (Building 709) during daily routine operations and maintenance of the missile system. Currently, each LF and LCF is a conditionally exempt, small quantity generator of hazardous waste because no more than a total of 100 kilograms (approximately 20 gallons) of waste per month are generated, in accordance with 40 CFR 261.5. The wastes at the MSB are collected either in grease traps, oil/water separators, 55-gallon drums, or storage tanks, and the wastes at the LFs and the LCFs are collected for storage in 55-gallon drums.

The hazardous materials from the deployment area sites (e.g., batteries) are transported to the missile support base (MSB) for temporary storage for further reuse; containerized wastes are transported from the deployment sites to waste accumulation sites at the MSB for temporary storage for up to 90 days. The containerized waste is then removed and disposed of from the base through the DRMO.

The Oil and Hazardous Substance Spill Prevention and Response Plan, also referred to as the Spill Prevention and Response Plan (SPR), at Whiteman AFB is comprised of the Spill Prevention Control and Countermeasure (SPCC) and Oil and Hazardous Substance Contingency (OHSC) Plans. The SPR identifies the location of hazardous materials and hazardous waste storage facilities and a description of the materials and wastes on the premises. The SPCC plan pertains to spill prevention measures, methods, and equipment utilized in base facilities, whereas, the OHSC lists the specific procedures to be followed in the event of a spill or release of oils or hazardous substances. These procedures include spill detection, reporting, containment, cleanup, and disposal. The annual update of the combined plan includes a written description of any spill events that have taken place at the facilities. The update includes corrective actions taken and plans for preventing recurrences. The plan is also updated to include a list of any new hazardous materials or hazardous waste accumulation points on the base.

The following subsections describe the types and quantities of hazardous materials/wastes and asbestos-containing wastes that would be handled during the deactivation process. The toxicity of heavy metals present and pesticides used at the LFs and LCFs is evaluated in appendix C.

3.7.2.1 Asbestos

If asbestos poses a health danger from the release of airborne fibers (when it is in a friable state), it is Air Force policy (AFR 91-42) to remove or isolate it. Asbestos is regulated under the Clean Air Act (CAA) because it is a designated hazardous air pollutant. Acting under the authority of the CAA, EPA has responsibility for administering the NESHAPS. Standards and guidelines were established within the Missouri Air Conservation Law to ensure that Missouri is in compliance with the provisions of the Federal CAA; these regulations are contained in the Emission Standards for Hazardous Air Pollutants (10 CSR 10, Chapter 6) and the interim policy letter for House Bill 77 (25 Sept. 89) and are enforced under the Missouri Department of Natural Resources, Air Pollution Control Program. The Missouri Department of Natural Resources requires certification of asbestos supervisors and workers and notification to the Department before renovating (involving encapsulating, enclosing, or removing activities) or demolishing a facility that has 10 square feet or 16 linear feet or more of friable asbestos-containing materials or materials that would become friable during the facility actions. The standard for controlling exposure to asbestos in the construction industry is outlined in 29 CFR 1926.58 and is administered by the Occupational Safety and Health Administration (OSHA). The complete removal of asbestos-containing materials is desirable and is included in planning operations,

maintenance, repair, minor construction, and military construction projects at opportune times and when safety and budgetary considerations permit.

The exhaust system for the diesel electric units (DEUs) at the LCFs contains asbestos insulation under the metal sheet covering. There are no known identified areas containing asbestos at the LFs. Other areas at the LCFs that have been sampled and contain asbestos include the elbows and joints of water pipe insulation and the jacket insulation around the water tank. Other potential sources of asbestos at the LCFs include floor tiling, roofing shingles, siding, and wallboard.

3.7.2.2 Polychlorinated Biphenyls

Electric filters within the equipment at the LFs and the LCFs are suspected of containing PCBs. These are used in lighting and switching circuits to protect critical equipment from electrical surges or arcing. Approximately 30 filters are contained in a power panel within the launcher equipment room (LER), level No. 1, of the launch tube; these filters are each approximately 6 inches long and 3 inches in diameter. Within the launch control equipment building (LCEB) at an LCF, the radio frequency interference (RFI) filter panel contains four hermetically sealed filters that are approximately 40 inches long and 4 inches in diameter. The launch control center (LCC) has a power panel that contains approximately three dozen small filters, approximately 6 inches long and 3 inches in diameter. The LCC also has approximately 15 lighting and switching filters (including fluorescent light ballasts) and a monitor panel.

All PCBs must be handled, stored, and disposed of in accordance with regulations (40 CFR 761) promulgated under the Toxic Substance Control Act (TSCA) and in accordance with the disposal regulations under the Missouri Hazardous Waste Management Rules.

3.7.2.3 Sodium Chromate Solution

Sodium chromate solution is used to cool the missile guidance set of the MM II missile. The initial cooling system in each LF included two 150-gallon tanks to store the solution. All of these tanks have been previously removed from the sites. The process has been replaced with a more efficient system that operates with less sodium chromate solution, approximately 10 gallons in the entire system, and no longer requires a large storage capacity (tank capacity is seven gallons). The mass of the solution is composed of 3 percent sodium chromate ($Na_2CrO_4 \cdot 10H_2O$), 2 percent sodium hydroxide, 5 percent dimethoxane (a broad-spectrum antimicrobial agent), and 90 percent water. Currently, Whiteman AFB is disposing of the sodium chromate solution as a hazardous waste.

The sodium chromate solution has been considered a hazardous waste on the basis of the assumption that the total leachable chromium (all valences) concentration meets or exceeds 5 mg/L with the toxicity characteristic leaching procedure (TCLP). The residual or spent liquid has been considered a hazardous waste subject to the requirements of RCRA and the Missouri Hazardous Waste Management Rules. A representative sample of the sodium chromate solution from the Whiteman AFB launch facilities was recently

taken and tested. The sample results verified that the chromium concentration exceeded 5 mg/L.

3.7.2.4 Diesel Fuel

Diesel fuel is used by the back-up emergency generators at the LFs and LCFs. Underground storage tanks that contain petroleum products are regulated under Subtitle I of RCRA (the Underground Storage Tank Program) and the requirements under the Missouri Underground Storage Tank Regulations (10 CSR 20, Chapter 10), except that release detection requirements do not apply to any underground storage tank (UST) system that stores fuel solely for use by emergency power generators. Underground storage tanks are discussed further in section 3.7.3.

Diesel fuel that is removed from the tanks is used at other locations or disposed of in accordance with all applicable regulations. Because the flash point of this diesel fuel is less than 140°F (DF-2 has a flash point of 125°F), it would then be considered an ignitable hazardous waste, subject to RCRA requirements and the Missouri Hazardous Waste Management Rules (10 CSR 25) if discarded. Unused diesel fuel is not considered a RCRA hazardous waste unless it has been contaminated with a hazardous substance not stored in the tank.

3.7.2.5 Ethylene Glycol

Ethylene glycol is used at LFs and LCFs as a coolant medium for the air-conditioning systems (brine chiller) and the diesel generators. The brine chiller at an LF and LCF contain approximately 38 gallons of ethylene glycol mixture. The diesel generator at the LF and LCEB contains approximately 11.5 gallons of ethylene glycol mixture and the diesel generator located topside in the soft support building contains approximately 16 gallons of ethylene glycol. The ethylene glycol within the coolant systems at the LFs and LCFs is isolated and does not come into contact with any other hazardous materials or waste products. Currently, the ethylene glycol that is removed from the diesel generators and the brine chiller system is recycled. If the ethylene glycol is determined to be a waste, then it is regulated as a non-RCRA hazardous waste under the Missouri Hazardous Waste Management Rules (10 CSR 25, Chapter 11). Freon, a fluorohydrocarbon, cools the system and is physically isolated from the ethylene glycol. Even in the case of accidental mixing of freon with ethylene glycol, the mixture would not be a hazardous waste.

3.7.2.6 Lead-Based Paint

The interiors of the launchers, the LCEB, and the LCCs were originally painted with paint containing red-lead pigment. When these interiors were first painted, lead was also used as a drying agent in paint. Unless otherwise specified, all exterior and interior ferrous metal, except reinforcing steel, bolts, rough hardware, and metals with nonferrous coatings were coated with a lead-based primer that conformed with Federal Specification TT-P-86, Type I or Type II. Two coats of flat alkyd paint conforming to

Federal Specifications TT-P-30 were applied over the primer. Although the lead content of the particular paint used is unknown, current industrial paints contain 15 to 18 percent lead by weight (DuPont, 1990; and Westinghouse Electric Corporation, 1990). The paint used at the LF and LCC sites is conservatively assumed to contain 20 percent lead by weight. Other heavy metals, such as chromium and mercury, are also likely to be in the paint. Lead-based paint on the exterior of the LF has recently been removed from all areas.

3.7.2.7 Pesticides

Pesticides, a group of biological or chemical materials that includes herbicides and insecticides, have been used at the LFs and LCFs. Pesticides have been used at the MSB for many years but are not discussed in this EIS because no disturbance of these application areas or change in practices would occur at the MSB regardless of the action adopted. A number of herbicides have been used to suppress weed growth around the LFs and LCFs since they were established in the early 1960s (table 3.7.2.7-1). In addition, one insecticide has occasionally been used on the inside of LCFs. Application rates on the pesticide labels were followed.

Primatol® 25E, a non-selective herbicide, was applied at the LFs and LCFs from the beginning of the Minuteman deployment until about 1984-85. Approximately 200 pounds of granular product were used at each of the LFs. The LFs were also spot treated with liquid Primatol®. The LCFs were treated around their fences and around driveways, helipads, and wherever rocks are located. Application records for pesticide products have been kept since 1985 when the Entomology Shop began maintaining the sites. Prior to 1985, the sites were maintained by the Roads and Grounds Shop (Zink, 1991).

Arsenal® was used from 1985 through 1990 at a rate of 200 pounds per site at 165 one-acre sites. In 1990, Expedite® was used to spot-treat undesirable weeds and grasses at a rate of 1.32 gallons per acre. Expedite® contains 1.66 pounds of active ingredient per U.S. gallon. The active ingredient in Expedite® is the same as that used in Roundup®, a more commonly known non-selective herbicide. Arsenal® is a systemic herbicide that is directly absorbed through the roots of the plant whereas Expedite® kills the plant by translocating to the roots of the plant through the leaf of the plant. Arsenal® has a longer residual time whereas Expedite® quickly breaks down. Norsac® 10G, a selective herbicide with dichlobenil as an active ingredient, was used at the sites prior to 1985 (Davenport, 1991).

The insecticide Micro-gen ULD BP-100, which contains the active ingredient pyrethrum, is occasionally applied at all 15 LCFs to control beetles. This pesticide is applied at a rate of 1 gallon per 2,000 square feet.

A plan for testing pesticide residues in soils at LFs is being formulated. Because herbicides must be applied each year to suppress vegetative growth, it is believed that residue levels will be negligible. Because no sampling data were available, a computer

analysis of residues based on the timing and rate of application of the aforementioned herbicides and typical weather patterns was performed (see section 4.7.2.7 and appendix A).

Table 3.7.2.7-1
Herbicide and Pesticide Use at LFs and LCFs,
Whiteman AFB

PRODUCT NAME	ACTIVE INGREDIENT	EPA NUMBER	CAS NUMBER	ACTION	DEPLOYMENT AREA	AMOUNT	CONCEN-TRATION
Arsenal®	Imazapyr	241-295	81510	NS Herbicide	1960s-1985	200 lb./acre	0.5%
Expedite®	Glyphosate	524-432	1071-83-6	NS Herbicide	1990-Present	1.32 gal. /acre	18%
Norsac® 10G	Dichlobenil	2217-675	1194-65-6	Herbicide	Unknown-1985	125-225 lb./ acre	10%
Pramitol® 25E	Prometon	100-443	1610-18-0	NS Herbicide	1960s-1985	50-170 gal.; 200 lbs/acre	Unknown
Micro-gen ULD BP-100	Pyrethroids	11540-5	8003-34-7	Insecticide	Unknown-Present	1 gal./2000 ft²	1%

Source: AF Form 2467s; 351 SPTG, Davenport, 1991

3.7.2.8 Mercury Switches

Mercury is contained in one sump pump switch at the LFs and the LCFs, within the thermostat in the electric unit heater, and inside a switch in the air-conditioning system at the LCFs. A glass bulb with less than 4 grams of mercury is in each switch, and small amounts of mercury are found in the thermostat. As currently handled, the mercury-containing items are brought back to the base for reuse. If the items are no longer used, then the mercury-containing items would be disposed as a hazardous waste.

3.7.2.9 Cadmium Electroplating

Cadmium electroplating was used on a 4-inch square for the electrical surge arrestor wall mount within the LFs and LCFs. The personnel access hatch ring was electroplated with cadmium prior to its installation in the LF. Cadmium is also a heavy metal subject to testing with the TCLP. If cadmium levels in a waste stream were to meet or exceed 1 mg/L, the waste stream would be categorized as a hazardous waste.

3.7.2.10 Lead-Acid Batteries

Lead-acid batteries are used as start-up power for the emergency back-up generators at the LFs and the LCFs. Each of the generators uses four sealed, maintenance-free, lead-acid batteries. Each of the batteries is about the size of a small toaster, weighs approximately 50 pounds, contains small quantities of sulfuric acid, and includes a series of lead plates. Two small lead-acid batteries are used in the automatic switching unit (ASU) at the LFs and the LCFs. All of the lead-acid batteries removed from the generators and the ASU at the LFs and LCFs are brought back to the base for reuse.

There are 10 lead-acid batteries in the LCC at 12 of the LCFs, and 12 batteries are used at the other 3 command post LCFs. These weapons system batteries are used to provide a back-up power system for the LCC in the event of discontinuation of conventional electric power and failure of the DEU. There are 12 lead-acid weapons system power supply batteries used within the launcher that vary in weight from approximately 1,365 to 1,450 pounds. All lead-acid weapons system batteries removed from the LF or LCC are transported back to the MSB for temporary storage for reuse. If they are unable to be reused, then they are disposed of through DRMO.

3.7.2.11 Potassium Hydroxide Batteries

Each missile guidance set (MGS) contains a potassium hydroxide battery for power after launching from the LF. These batteries are considered class C explosives, labeled corrosive, and contain approximately 1 quart of potassium hydroxide. When the RV/G&C van returns from the deployment area with an MGS, the unit is delivered to the Electronics Laboratory in Building 709, and the batteries are removed and stored in a cabinet in the MGS vault until further use; the process is reversed for MGSs transported to the deployment area for installation on the MM II missile. The battery is also removed when the MGS is readied for shipping. If the batteries are no longer used, then they are disposed of in accordance with all applicable regulations.

3.7.3 Aboveground/Underground Storage Tanks

Sections 2.2.3 and 2.2.4 provided a description of the USTs at each LF and LCF, respectively. Large USTs at each LF (14,500 gallons) and LCF (14,500 and 2,500 gallons) contain diesel fuel to run back-up power generators. Because they are used as a fuel source for the emergency generators, the USTs are deferred from the federal EPA regulation and the requirements under the Missouri Underground Storage Tank Regulations (10 CSR 20, Chapter 10) for release detection requirements. However, the tanks are still regulated for the 22 December 1998 deadline for corrosion and spill/overfill protection, as well as proper closure. A 30-day notification must be given to the State before UST removal or closure.

The cathodic protection system at the LFs and the LCFs provides protection to all of the metal features underground, including the USTs. An annual cathodic protection survey is performed and inspections on the power meter readouts are performed monthly. Over the past years, deep well anodes have been replaced at various sites based on the power meter readout inspections. An inspection would also be performed if work proposed for the site would disturb the site topography or if a UST or its piping is being repaired or replaced.

There are no records of any fuel leaking from USTs, but there have been some minor maintenance tasks performed on selected USTs (e.g., a brass coupling was recently repaired on the top of the tank at one of the LFs). Although there were no indications of leaks from the tanks and pipes at the LCF sites, four of the 14,500-gallon USTs (at C-1, I-1, J-1, and M-1), and three of the 2,500-gallon USTs (at I-1, J-1, and M-1), were

upgraded under a tank upgrade program for Whiteman AFB. The tank lining activities were performed in accordance with all applicable regulations. They were cleaned, visually and physically inspected for tank integrity, sandblasted, lined with a glass bed epoxy coating on the inside of the tank (an *in situ* process), and finally tank-tightness tested. Also, all of the piping was replaced at the same time.

Each LCF also has a 2,000-gallon aboveground storage tank that contains unleaded gasoline and is used for fueling maintenance vehicles. This tank is located outside the security fence and along the access road.

3.7.4 Solid Waste

Solid wastes are all waste materials that are neither hazardous nor toxic and that are normally disposed of by landfilling or incineration, or are recycled or recovered. Solid wastes, which include non-hazardous trash, bulky wastes, soil, rock, liquids or sludges, slurries, and recoverable trash, are generated by the deployment sites and the on-base missile support operations building (709) at Whiteman AFB during daily routine operations and maintenance of the missile system. These wastes are appropriately containerized at the sites and transported to the MSB where they are collected in the dumpsters near the base facilities. A contractor, The Omega One Company, collects the wastes from the dumpsters on base and the smaller trashbins in the family housing areas, and transports these wastes for disposal in the Johnson County Landfill.

The Johnson County Landfill, located approximately 4 miles west of the base near the city of Warrensburg, has a permitted area of 40 acres. Records of the daily base logs from December 1990 through November 1991 indicate that approximately 150 yd^3 of solid waste are removed weekly, or roughly 7,800 yd^3 per year (USAF, 1991i). The landfill accepts approximately 600 yd^3 of solid waste per day or approximately 219,000 yd^3 per year, of which 4 percent is from Whiteman AFB. At this current rate of use, the landfill has an estimated remaining lifetime of 2 years; however, the county has started action to obtain another permitted site of 80 acres adjacent to the landfill. The solid wastes are managed in accordance with RCRA, Subtitle D and the Missouri Solid Waste Rules (10 CSR 80, Chapters 1-7).

3.8 NOISE

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, intermittent or continuous. The human response to noise is generally divided into three categories: physiological, which is primarily hearing loss; behavioral, which includes speech and sleep interference; and subjective, which is predominantly annoyance.

Noise produced by aircraft during takeoff and landing operations are of major interest. These noises fall within a broad range of transient noises, which come and go in a finite period of time. Dependent primarily on the type of aircraft, the type of operations, and the distance from the observer to the aircraft, the maximum flyover noise levels vary widely in magnitude, ranging from levels undetectable in the presence of other background noise, to levels sufficiently high to create feelings of annoyance, to levels that interfere with speech or sleep. The duration of the noise will also vary depending on the proximity, speed, and orientation of the aircraft with respect to the observer.

The evaluation of aircraft noise requires descriptions of the noise associated with individual aircraft flyovers and of the cumulative effect of a number of events that occur over some period of time. Factors that have been found to affect the subjective assessment of the daily noise environment include the noise levels of individual events, the number of events per day, and the time of day at which the events occur. Most environmental descriptors of noise are based on these three factors, although they may differ considerably in the manner in which the factors are taken into account.

The descriptor of a 24-hour daily noise environment is the day-night average sound level (L_{dn}). To compute an L_{dn}, a single noise event is measured, with corrections added for the number of events and the time of day. A 10-decibel penalty is added for noise that occur during the nighttime hours of 10 p.m. to 7 a.m to account for the "startle effect." The L_{dn} descriptor is accepted by Federal agencies as a standard for estimating noise impact and establishing guidelines for compatible land uses. The USAF has adopted the L_{dn} as the measure for noise regulations.

Federal agencies accept the L_{dn} descriptor as a standard for estimating noise impacts and establishing guidelines for compatible land uses. Under the U.S. Department of Housing and Urban Development (HUD) criteria, areas in which noise levels of 75 L_{dn} or greater occurs are considered unacceptable living environments. The number of daily aircraft operations directly affect the level of noise in the vicinity of an Air Force base. Currently, the aircraft operations that occur at Whiteman AFB are generated primarily from transient and tenant aircraft. Military Airlift Command (MAC) C-141s and C-130s are transient aircraft that conduct operations at Whiteman AFB and contribute to the average daily level of aircraft noise. These aircraft are used to transport MM II components, primarily boosters, to maintenance facilities. A wide variety of other transient aircraft conduct operations at Whiteman. The largest (which usually coincides with higher noise levels) of these aircraft include the C-5, KC-135, and B-52, whereas the smallest aircraft include twin- and single-engine propeller Cessnas. Transient attack,

fighter, and training aircraft, including the A-10, F-14, F-15, F-16, F-18, T-37, and T-38 also operate at Whiteman AFB (Karlowitz, 1992). A small percentage (less than 5 percent) of the transient and tenant aircraft operations originate from the movement of missile components off base.

The Air Force examines the effects of aircraft noise and accidents on communities near Air Force installations, using the Air Installation Compatible Use Zone Program (AICUZ). Whiteman AFB has an AICUZ program and noise contours showing L_{dn} levels in the base vicinity. However, because these contours are outdated (1975), they are of limited use. An AICUZ study for the B-2 mission, based on aircraft with similar and louder noise levels, has been completed in the past and is being updated with studies on the noise levels and patterns that would be attributable to B-2 flights.

Det 9, 37 ARS based at Whiteman AFB generates noise in the deployment area during missile support missions. Det 9 is composed of five single-engine HH-1H helicopters (three Primary Aircraft Authorizations and two back-up inventory) that perform an average of 1.5 missile support missions per working day (Curtis, 1992). The total average number of aircraft (airplane and helicopter) operations per working day was 36 in 1991. Consequently, these operations do not generate significant average daily noise levels (greater than 75 L_{dn}) in the vicinity of the base.

Whiteman AFB received four noise complaints in 1990 and two noise complaints in 1991. These complaints originated because of sonic booms created by low-flying aircraft from another base (Yates, 1991).

Background noise levels in the deployment area are similar to those in other rural areas. The agricultural land in the deployment area has background noise levels of approximately 33 to 55 L_{dn}, with higher levels near major roads and highways (USAF, 1987). Traffic in the deployment area is sporadic; nearly all the roads have a level of service (LOS) class A (Section 3.9 discusses baseline transportation information). Traffic is moderately heavy in areas near Kansas City and light in rural areas. Roads categorized as LOS B generally occur in areas closer to larger towns, including Sedalia and Warrensburg.

In addition to routine maintenance at LFs, which requires the use of maintenance vehicles, movements of rocket boosters and missile components occur in separate, large vehicles (TEs and RV/G&C vans). Recently (1989-1990), four to eight missile movements of an RV and MGS within an RV/G&C van occurred per month (Curtis, 1992). The transportation of these components requires the support of a helicopter as part of the convoy operations. Only failure replacements (approximately one per month) are currently being performed. The vehicles used to maintain and move the missiles contribute to the level of noise both in the deployment area and on the base. Noise levels at the MSB range from 51 to 71 L_{dn} and are influenced primarily by vehicular traffic, maintenance equipment, and construction.

3.9 TRANSPORTATION

The deployment area covers approximately 5,300 mi^2 in west central Missouri. The primary road network in this area includes five major east-west roads (Interstate 70; U.S. 50, and 54; and Missouri State Highways 7 and 52) and four major north-south roads (U.S. 65, and 71; and Missouri State Highways 5 and 13). The MSB is approximately 5 miles south of U.S. 50 and 20 miles south of I-70. The 508 MS is accessed by I-70, U.S. 50 and 65, and MO 52. The 509 MS is accessed by U.S. 54, 71, and MO 7 and 13. The 510 MS is accessed by I-70, U.S. 50, and MO 13.

The LFs and LCFs are accessed primarily along paved, two-lane, state and county roads. Approximately 1,500 miles of road network, including 43 miles of gravel road, are used by vehicles in support of the missile mission. Whiteman AFB has an agreement with the Missouri Highway and Transportation Department, which provides for the removal or treatment of snow from roads that are used in support of the missile activities on a first priority basis. Normal snow removal, throughout the state, is performed according to a prioritized breakdown of road use by average daily traffic (ADT). The order of priority for clearing roads is generally interstates, then primary roads, and finally supplementary roads. However, roads with ADT of 2,000 or more vehicles are cleared before any other roads (Missouri Highway and Transportation Department, 1991).

Approximately 18,000 trips per year are dispatched for TEs, RV/G&C vans, capsule crews, maintenance crews, civil engineering services, supervisors, quality control engineers, food services, and communications personnel. TEs made 46 trips in 1991 and 90 trips in 1990. RV/G&C vans made 195 trips in 1991 and 225 trips in 1990. More trips were made in years previous to 1991 because of Rivet MILE activities. Security police make non-dispatched trips to LFs and LCFs.

Vehicle trips to LFs average approximately 60 miles one-way. Trips to LCFs, which are generally closer to the MSB, average approximately 40 miles one-way. Most of the dispatched traffic occurs Monday through Friday, with an average of 60 trips per day. On weekends, traffic to LFs and LCFs averages 20 trips per day. Approximately 4 million miles were driven in support of the mission in FY91, of which nearly 90 percent, (or 3.6 million miles), were driven within the deployment area.

A normal maintenance schedule involves removing between four to eight missiles each month and transporting them from LFs to the MSB for servicing. Since Rivet MILE was canceled for Whiteman AFB, only failure movements are performed. Approximately one missile per month was replaced in 1991. A missile movement involves a maintenance vehicle traveling the route from the MSB to the LF to check road conditions before the service trip. As part of the same missile movement, a security escort, a RV/G&C van (these vehicles travel on one day), and a TE (this vehicle travels the next day) move from the MSB, to the deployment area and back to the MSB. A maintenance van would be at the site each day and might or might not travel with the other vehicles. Another missile movement for the replacement missile would involve the same types of vehicles.

A total of 49 non-reportable mishaps (less than $10,000 damage and/or no lost duty time for individuals involved in the accident) involving general purpose Air Force vehicles occurred during fiscal year 1990. Of these mishaps, 22 occurred off-station, and 15 of those occurred with vehicles in direct support of the 351 MW mission. The vehicles involved in non-reportable mishaps ranged in size from small pickup trucks to tractor-trailers. One reportable accident occurred in 1991 and involved a non-weapon system vehicle in support of the missile activities. Deer strikes pose a safety problem within the deployment area. There have been a smaller percentage of strikes involving government vehicles than private vehicles (351 MW/SEG, 1991).

Traffic in the deployment area varies from moderately heavy in areas near Kansas City to light in rural areas. The majority of roads in the area have a level of service (LOS) of A that corresponds to free-flowing traffic with low volumes and high speeds. Other roads in the area have an LOS of class B, which corresponds to a stable traffic flow, but speeds and maneuverability are inherently controlled by high volumes. LOS class B generally occurs in areas closer to larger towns including Sedalia and Warrensburg.

Traffic counts indicate that on average approximately 21,000 vehicles per day travel along the portion of I-70 that traverses the deployment area. The four major U.S. highways, 50, 54, 65, and 71, are traveled by 3,000 to 11,000 vehicles per day. The four major state roads within the missile complex range from 1,000 to 7,000 ADT. County roads leading to LFs and LCFs range in ADT of less than 100 vehicles in rural, agricultural areas, to 1,000 vehicles on roads closer to metropolitan areas.

Table 3.9.1-1 lists the State of Missouri highway construction projects planned for 1991 to 1993 that either directly affect routes to LFs and LCFs or occur near LF and/or LCF sites. Many minor construction projects are planned for roads within the deployment area; these include traffic signal changes, lane adjustments, lighting modifications, and resurfacing. Generally these projects each affect less than 5 miles of road and often less than 1 mile. The Missouri Highway and Transportation Department has proposed a 15-year program for road improvements in Missouri (Sedalia Democrat, January 4, 1992). This plan, if approved, would accelerate current construction projects, as well as create projects for 1994 and into the future. Projects under this program may occur on roads within the deployment network and/or near LFs and LCFs.

ACC provides Air Force Operations and Maintenance (O&M) funds to improve roads on TE routes. These funds pay for extraordinary repair and maintenance, snow removal, and bridge repair/replacement along missile complex routes. The expenditures for FY90 amounted to approximately $350,000, which included $25,000 for a regravelling program that had not been funded in previous years. The expenditures for FY91 were approximately $1.4 million, most of which was spent in maintenance of right-of-ways (Missouri Highway and Transportation Department, 1991).

Table 3.9-1
Major[1] Highway Construction Projects
Scheduled for 1991, 1992, and 1993

Route	Location	Description	Cost ($ Millions)	Length (miles)
MO 7	Garden City	Grading, surfacing	4.3	3.3
MO 132	Rt. 50 to WAFB	Grading, surfacing	8.5	2.4
MO 7	Clinton	Grading, surfacing	7.1	3.1
I-70	West of Rt. 135	Surfacing, bridge replacement	4.5	.9
MO 52	Rt. 5 to Miller Co.	Grading, surfacing	2.1	11.8
MO 7	Garden City	Grading, surfacing	6.5	6.1
US 65	Pettis Co. to Lincoln	Surfacing	2.1	12.1

[1] As defined here, construction projects were considered major if the cost would be greater than $4 million or the length of the project exceeded 10 miles.

Source: Missouri Highway and Transportation Department, 1991.

3.10 SOCIOECONOMICS

3.10.1 Regions of Influence

Whiteman AFB is located in Johnson County in west central Missouri, 2 miles south of the town of Knob Noster, 9 miles east of Warrensburg, and 65 miles southeast of Kansas City. The MM II system deployment area includes 14 counties. As shown in figure 3.10.1-1, there are two Regions of Influence (ROIs) identified for the socioeconomic analysis—the 3-county primary area of Johnson, Pettis, and Henry Counties and a secondary area consisting of the remaining 11 counties in the deployment area.

Approximately 54 percent of all Whiteman AFB personnel live off-base; the selection of the three-county primary area was based on resident location patterns for these off-base military personnel. As shown in table 3.10.1-1, 97.6 percent of off-base personnel live within the three-county area, with Johnson County accounting for the majority of residences. Knob Noster, Warrensburg, Sedalia, La Monte, and Windsor also have been identified as key communities for analysis on the basis of the concentration of off-base military personnel residing in these areas.

Socioeconomic resources are described in this section using employment and demographic measures. These elements are the key factors influencing housing demand, education needs, infrastructure requirements, public finance, and land use changes. Appendix D contains detailed tables of socioeconomic characteristics of the regions of influence.

3.10.2 Population

The 14-county deployment area is typically rural with the exception of the more urban Cass County and Johnson County. Cass County is part of the Kansas City Metropolitan Statistical Area (MSA), and Johnson County also includes communities in the western portion that rely on extensive commuting to Kansas City for employment. Ten of the 14 counties had 1990 populations of less than 25,000 and are characterized as rural areas (table 3.10.2-1).

Within the 3-county primary area, Pettis County experienced a population decline during the past decade, Henry County was stable at about 20,000, and Johnson County grew approximately 1 percent annually from 39,000 to 42,500. The communities of Sedalia, La Monte, and Windsor experienced slight population declines, whereas the two communities of Warrensburg and Knob Noster grew at about 1 percent annually.

The 11-county secondary area grew in population by approximately 16,500 people, including an increase of 12,800 people in Cass County (75 percent of the growth in the secondary ROI). Six of the secondary area counties declined or had stable population levels registering less than 0.2 percent growth. Based on the population distribution of military personnel, the analysis will focus on the three-county ROI.

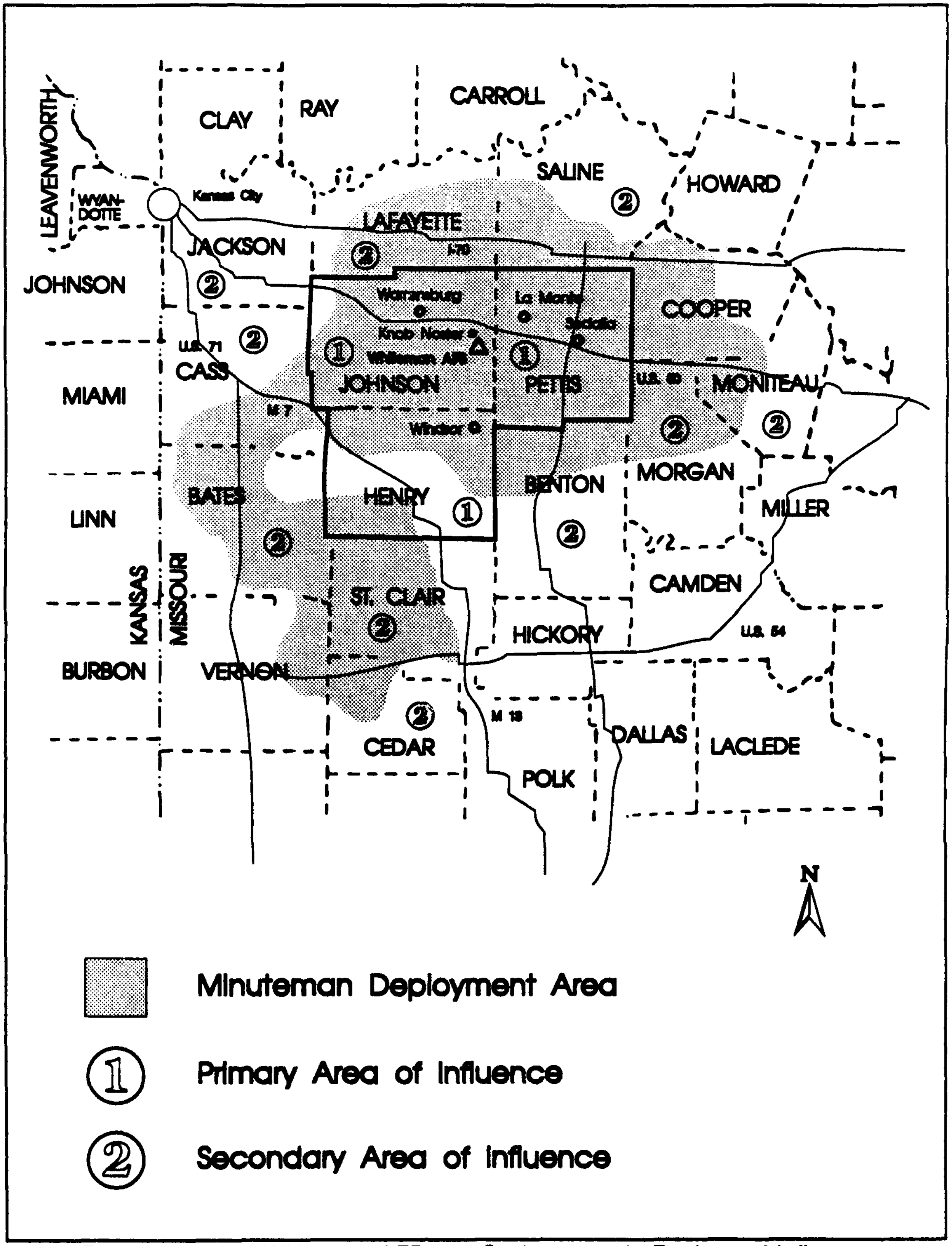


Figure 3.10.1-1 Whiteman AFB and Socioeconomic Regions of Influence

Table 3.10.1-1 Residence Location of Whiteman AFB Military Personnel Living Off-Base			
County	**Location**	**Number of Personnel**	**Percent of Total**
Johnson County	Knob Noster	648	40.7%
	Warrensburg	610	38.3%
	Remainder of County	28	1.8%
	Total	1,286	80.8%
Pettis County	Sedalia	107	6.7%
	La Monte	76	4.8%
	Remainder of County	11	0.7%
	Total	194	12.2%
Henry County	Windsor	68	4.3%
	Remainder of County	5	0.3%
	Total	73	4.6%
Jackson County	Total	23	1.5%
Other Areas (Lafayette, Saline, Benton and Cass Counties)	Total	15	0.9%
Total[a]		**1,591**	**100%**

[a] Total personnel assigned to Whiteman AFB includes 1,591 off-base personnel as shown in this table, 1,381 personnel living on base, 122 assigned in Leavenworth, Kansas, and 84 personnel located at scattered locations primarily in Missouri.

Source: Whiteman AFB Consolidated Base Personnel Office; November 1991.

3.10.3 Employment and Income

The number of individuals employed and the rate of unemployment are key indices for measuring the economic viability of a given market. From 1988 to 1991, the number of people employed in the three-county ROI increased by 1,065 people. Johnson County had the largest increase with 1,028, while the labor force in Pettis County increased by 238 and an employment decline of 201 occurred in Henry County. The 1991 rate of unemployment was lowest in Johnson County (4.4 percent) as compared with 6.6 and 8.2 percent in Pettis and Henry Counties, respectively, and 6.1 percent at the State level (table 3.10.3-1). Recent employment trends in the secondary ROI are similar to those for the primary ROI.

Table 3.10.2-1
Population Characteristics – Region of Influence

Area	Population 1980	Population 1990	Average Annual Growth Rate	Projected 1995 Population*
Primary Area Counties				
Johnson	39,059	42,514	0.9%	43,823
Knob Noster	2,040	2,261	1.0%	2,113
Warrensburg	13,807	15,244	1.0%	15,766
Pettis	36,378	35,437	-0.3%	34,895
Sedalia	20,927	19,800	-0.6%	19,215
La Monte	1,054	995	-0.6%	935
Henry	19,672	20,044	0.2%	20,202
Windsor	3,058	3,044	-0.1%	3,009
Total	**95,109**	**97,995**	**0.3%**	**98,920**
Secondary Area Counties				
Bates	15,025	15,873	0.6%	16,315
Benton	12,183	13,859	1.3%	14,782
Cass	51,029	63,808	2.3%	71,352
Cedar	11,894	12,093	0.2%	12,194
Cooper	14,643	14,835	0.1%	14,932
Lafayette	29,931	31,107	0.4%	31,712
Moniteau	12,068	12,298	0.2%	12,415
Morgan	13,807	15,574	1.2%	16,541
St. Clair	8,622	8,457	-0.2%	8,376
Saline	24,916	23,523	-0.6%	22,856
Vernon	19,806	19,041	-0.4%	18,670
Total	**213,924**	**230,468**	**0.7%**	**240,142**
Deployment area (14 counties)	309,033	328,463	0.6%	339,062
State of Missouri	4,916,766	5,167,200	0.5%	5,297,161

*Population in primary area is adjusted for 299 personnel lost due to DoD restructuring.

Source: U.S. Bureau of the Census, 1980 and 1990.

Table 3.10.3-1 Labor Force Characteristics – Region of Influence						
County	Labor Force Characteristics	1988	1989	1990	1991*	Total Percent Change 1988-91
Johnson	Employed	18,926	20,183	19,741	19,954	5%
	Percent unemployed	3.8	4.1	4.4	4.4	
Pettis	Employed	17,018	17,050	17,184	17,256	1%
	Percent unemployed	6.2	6.9	6.8	6.6	
Henry	Employed	8,002	8,020	7,795	7,801	-3%
	Percent unemployed	7.8	8.5	8.3	8.2	
Three-County Total	Employed	43,946	45,253	44,720	45,011	2%
	Percent unemployed	5.5	6.0	6.0	5.9	
Secondary Area (11 counties)	Employed	100,446	100,098	100,400	101,549	1%
	Percent unemployed	6.5	6.5	6.4	5.8	
Missouri	Employed (000)	2,446	2,471	2,483	2,511	2.6%
	Unemployed	5.7	5.5	5.7	6.1	

*September 1991

Source: U.S. Bureau of Labor Statistics, 1991.

The major employment sectors for the three-county primary area and the State are shown in table 3.10.3-2. Johnson County is unique among the comparison areas: approximately 40 percent of employment is attributable to the government sector. This high percentage is primarily related to the military employment at Whiteman AFB and the employment generated at Central Missouri State University (CMSU). Military, state, and local governments in Johnson County account for 36 percent of the county's total employment. Pettis and Henry Counties more closely reflect the State's employment mix with a stronger dependency on the trade and service sector as the primary area of employment (approximately 50 percent of the employment base).

Table 3.10.3-3 shows measures of economic diversification and stability. Economic sector diversification indices are used to determine the extent to which a county or region is diversified relative to the United States as a whole with the implication being that more diverse economies are typically able to withstand and adjust to economic fluctuations. Diversification values range from 0.0 to 1.0. A value of 1.0 indicates that a local economy had an employment mix identical to that of the United States. Correspondingly, low index values show that a local economy has employment in only a few economic sectors, and thus may be more subject to impact if changes occur within those few sectors. As compared with the larger metropolitan areas in the state,

Table 3.10.3-2
Major Employment Sectors — Primary Region of Influence, 1989

Employment Category	Johnson County		Pettis County		Henry County		State of Missouri	
	Empl.	% of Total	Empl.	% of Total	Empl.	% of Total	Empl.	% of Total
Agriculture/Mining	176	0.9%	235	1.2%	124	2.0%	28,073	0.9
Construction	916	4.6%	1,150	5.9%	N/A	0.0%	151,317	5.3
Manufacturing	2,136	10.7%	3,660	18.8%	1,547	24.5%	447,896	15.6
Transportation/ Public Utilities	954	4.8%	901	4.6%	450	7.1%	175,437	6.2
Trade and Services	7,519	37.7%	10,689	55.0%	2,781	44.0%	1,663,021	57.9
Government	8,266	41.4%	2,802	14.4%	1,418	22.4%	404,505	14.1
Federal and Civil	(1,067)	(5.3%)	(161)	(0.8%)	(99)	(1.6%)	(72,266)	(2.5)
Military	(3,524)	(17.6%)	(249)	(1.3%)	(136)	(2.2%)	(51,284)	(1.8)
State and Local	(3,675)	(18.4%)	(2,392)	(12.3%)	(1,183)	(18.7%)	(280,955)	(9.8)
Total	**19,967**	**100.0%**	**19,437**	**100.0%**	**6,320**	**100.0%**	**2,870,249**	**100.0**

Source: U.S. Bureau of Economic Analysis, 1991.

including Kansas City and St. Louis with diversification indexes of 0.8123 and 0.7601, the individual counties have relatively low diversity indexes, indicating a susceptibility to a change in any key sector. For example, any major changes at Whiteman AFB or CMSU could have fairly significant impacts on the local economy of Johnson County, which is highly dependent on these government employment centers. The secondary ROI was more diversified than the primary ROI.

An analysis of historic fluctuations in employment provides an indication of a range of changes that the area has experienced. This serves as a baseline for evaluating significant effects from employment increases or decreases. During the period 1980 to 1989, the largest employment decrease (on a percentage basis) for one year occurred in Johnson County; a loss of 964 jobs resulted in an employment decrease of 5.1 percent. Pettis and Henry Counties had lower employment decreases and higher employment increases than for Johnson County during any given year.

Since 1987, civil service and military employment at Whiteman AFB has fluctuated from approximately 3,500 to a high of nearly 3,700 and in 1991 was at approximately 3,600 (table 3.10.3-4). Construction expenditures at the base were primarily in preparation for the proposed deployment of the B-2, and have ranged from $12 million in 1987 to $84

Table 3.10.3-3
Economic Fluctuation and Diversification Measures in Region of Influence

County	1987 Diversity Index	1987 Sector of Maximum Employment	1980-1989			
			Largest One-Year Employment Decrease		Largest One-Year Employment Increase	
			Number	Percent	Number	Percent
Johnson	0.2225	Government	-964	-5.1	1,070	5.1
Pettis	0.2874	Services	-434	-2.4	1,296	7.3
Henry	0.2028	Services	-322	-3.3	713	7.6
Total	**0.3627**	**Government**	**-1,720**	**-3.7**	**2,564**	**5.2**
Secondary Area (11 counties)	0.4426	Services	-649	-0.8	3,017	3.6

Source: U.S. Bureau of Economic Analysis, 1991.

Table 3.10.3-4
Whiteman AFB Employment and Construction Expenditures, 1987-1991

Whiteman AFB Value of Construction Expenditures		Whiteman AFB Civil Service and Military Employment		
Year		Civilian	Military	Total
1987	12,321,286	468	3,036	3,504
1988	16,306,178	503	3,000	3,503
1989	57,521,432	528	3,153	3,681
1990	83,879,462	512	3,107	3,619
1991	27,542,169	436	3,175	3,611

Source: Whiteman AFB Economic Resource Impact Statements, 1987 through 1991.

million in 1990. A survey conducted by the on-site Corps of Engineers office indicated that the construction volume of $57.5 million in 1989 generated approximately 600 construction jobs during the recent peak of construction in 1990 (USAF, 1990b). Employment at CMSU has been fairly constant at about 860 employees and enrollment has shown fairly steady growth in recent years from a level of 8,300 to about 9,900 in 1991 (see appendix D). Future expansion plans include a new library (however, funding has not yet been approved for the project).

The primary ROI has a moderate income base with median household income levels below the State's median of $25,574. Johnson and Pettis Counties have median incomes of about $20,000 or about 20 percent below the State. The income base in Henry County is significantly below the other counties in the ROI (table 3.10.3-5).

Table 3.10.3-5
Income Characteristics — Region of Influence

		Percent of Households by Income Group					
County/ Area	Median Household Effective Buying Income, 1990	Under $10,000	$10,000-$19,999	$20,000-$34,999	$35,000-$49,999	$50,000 and over	Total
Johnson	$20,830	20.2%	27.8%	27.3%	13.8%	10.9%	100.0%
Pettis	$21,459	20.8%	26.1%	26.2%	14.6%	12.3%	100.0%
Henry	$16,344	31.2%	27.0%	22.7%	11.8%	7.3%	100.0%
State of Missouri	$25,574	18.0%	21.6%	25.5%	16.8%	18.1%	

Source: Sales and Marketing Management, 8/19/91.

3.10.4 Housing

During the past decade, Johnson County has had the highest growth in housing units with an increase of 2,100 units compared to less than 700 units in Pettis and Henry Counties combined (table 3.10.4-1). The distribution between owner and rental unit is about the same in Pettis and Henry Counties with three fourths of the units being owner-occupied housing. Johnson County, in part because of the influence of Whiteman AFB and CMSU, has a higher percentage of rental units which represent 43 percent of the available housing stock. Vacancy rates for owner housing units are relatively low in the three primary counties (between two and three percent) with the highest being in the community of La Monte (4.3 percent). Vacancy rates among rental units were relatively high and typically above 10 percent. The communities of La Monte and Knob Noster had the highest vacancy rates with 16.0 percent and 26.5 percent, respectively.

As shown in table 3.10.4-2, the highest median housing values ($62,300) and monthly rental rates ($290) are in the Warrensburg market. Knob Noster had the second highest median housing values ($52,200) and rental rates ($243). Median housing values were below $40,000 in La Monte, Sedalia and Windsor and the contract monthly rent was below $225. Although these values are from the 1990 Census and thus represent data collected approximately two years ago, it is assumed that the relative differences among the affected communities are about the same.

Table 3.10.4-1
Housing Characteristics — Region of Influence, 1980 and 1990

County/City	Owner-occupied Housing			Rental Units			Total Housing Units*		
	% Occupied	% Vacant for Sale	Total Units	% Occupied	% Vacant for Rent	Total Units	% Occupied	% Vacant	Total Units
1980									
Johnson	97.6%	2.4%	7,936	89.6%	10.4%	5,344	94.4%	5.6%	13,280
Knob Noster	95.8%	4.2%	357	87.1%	12.9%	505	90.7%	9.3%	862
Warrensburg	98.8%	1.2%	2,071	88.4%	11.6%	2,323	93.3%	6.7%	4,394
Pettis	97.9%	2.1%	10,696	87.9%	12.1%	3,830	95.3%	4.7%	14,526
La Monte	97.5%	2.5%	284	78.2%	21.8%	170	90.3%	9.7%	454
Sedalia	98.0%	2.0%	6,290	88.9%	11.1%	2,724	95.3%	4.7%	9,014
Henry	97.7%	2.3%	5,984	92.1%	7.9%	2,083	96.2%	3.8%	8,067
Windsor	96.8%	3.2%	1,092	83.7%	16.3%	276	94.2%	5.8%	1,368
1990									
Johnson	97.9%	2.1%	8,732	90.5%	9.5%	6,663	94.7%	5.3%	15,395
Knob Noster	96.9%	3.1%	424	73.5%	26.5%	648	82.7%	17.3%	1,072
Warrensburg	97.4%	2.6%	2,173	91.7%	8.3%	3,146	94.0%	6.0%	5,319
Pettis	97.3%	2.7%	10,755	89.8%	10.2%	3,999	95.3%	4.7%	14,754
La Monte	95.7%	4.3%	276	84.0%	16.0%	150	91.5%	8.5%	426
Sedalia	96.9%	3.1%	5,992	89.6%	10.4%	2,913	94.5%	5.5%	8,905
Henry	97.9%	2.1%	6,140	92.6%	7.4%	2,352	96.4%	3.6%	8,492
Windsor	97.3%	2.7%	1,016	90.2%	9.8%	307	95.7%	4.3%	1,323

* Total units does not include housing units held for occasional use or other vacant units that, at the time of the 1990 Census, were not available for sale or rent.

Source: U.S. Bureau of Census, 1980, 1990.

Table 3.10.4-2
Median Housing Values and Contract Rent in 1990 — Primary Region of Influence

		Median Housing Value ($)	Median Contract Rent ($)
Johnson		55,300	275
	Knob Noster	52,200	243
	Warrensburg	62,300	290
Pettis		40,100	223
	La Monte	35,600	182
	Sedalia	37,200	224
Henry		36,500	179
	Windsor	31,400	175

Source: U.S. Bureau of the Census, 1990.

The percent of each market that is occupied by military households is important in analyzing the dependency of a given housing market on Whiteman AFB personnel.

Based on the residence patterns of Whiteman AFB off-base military personnel, it is estimated that these personnel occupy 73 percent[1] of Knob Noster's housing units (table 3.10.4-3). Other markets with high concentrations of military-occupied housing units include La Monte with approximately 20 percent and Warrensburg with 12 percent. Sedalia and Windsor have relatively low percentages of military households with one percent and five percent, respectively.

Table 3.10.4-3
Whiteman AFB Off-Base Military Households as a Percent of All Households in Primary Region of Influence

County	Location	Number of Military Personnel (Households)[1]	1990 Occupied Housing Units	Military Households as % of Total Households
Johnson County	Knob Noster	648	887	73.1%
	Warrensburg	610	5,002	12.2%
	Remainder of County	28	8,690	0.3%
	Total County	1,286	14,579	8.8%
Pettis County	Sedalia	107	8,416	1.3%
	La Monte	76	390	19.5%
	Remainder of County	11	5,250	0.2%
	Total County	194	14,056	1.4%
Henry County	Windsor	68	1,266	5.4%
	Remainder of County	5	6,923	0.1%
	Total County	73	8,189	0.9%
Total		**1,591**		

[1]It is assumed that there is one household per military personnel member.

Source: Whiteman AFB Consolidated Base Personnel Office, 1991; U.S. Bureau of the Census, 1990.

[1] This percentage may be higher than an actual count would reveal. Many military personnel may live outside the Knob Noster corporate limits but list Knob Noster as their place of residence.

3.10.5 Retail Shopping Patterns

A shopping survey of military personnel at Whiteman AFB was conducted in 1991 that indicated 65 percent of on-base personnel shop at least 4 times a month at off-base retail facilities in the surrounding communities. The survey showed that the majority of the shopping (over 60 percent) was conducted in Warrensburg. Kansas City had a higher preference among respondents (13 percent) than was evident for the closer Sedalia market (11 percent). The retail shopping preference patterns (table 3.10.5-1) closely mirror military housing residence preferences.

Table 3.10.5-1
Off-Base Retail Shopping Patterns for Whiteman AFB Military Personnel

	Percent of Survey Respondents Rating Their Most Frequent Off-Base Shopping Area		
Retail Market	**On-Base Military**	**Off-Base Military**	**On-Base, Off-Base and Retired Military**
Columbia	0.0	0.5	0.3
Kansas City	12.1	17.6	13.4
Knob Noster	8.6	6.4	7.6
Sedalia	8.6	5.3	11.4
Warrensburg	65.5	65.4	60.0
Other areas/No answer	5.2	4.8	7.3
	100.0	100.0	100.0
Frequency of Shopping Off-Base			
Less than once a month	12.9	5.9	7.3
1 to 3 times a month	21.6	19.7	20.2
4 to 6 times a month	34.4	26.6	29.0
More than 6 times a month	30.2	47.3	42.7
No response	0.9	0.5	0.8
	100.0	100.0	100.0

Source: Whiteman Area Steering Council, 1991. "Shopping Survey of the Military Consumer at Whiteman Air Force Base," February 21, 1991.

The number of retail stores (119) and sales volume ($119 million) in Warrensburg is almost one-half of the Sedalia market with 222 retail stores and over $200 million in sales. Windsor, the largest city in Henry County within the deployment area, has only

30 stores and sales of only $10 million (table 3.10.5-2). The preference of military personnel for shopping in Warrensburg indicates that retail stores in this market are dependent on Whiteman AFB for a significant share of their business.

There are 105 service business in Warrensburg with receipts of $23.5 million that are also dependent on the Whiteman AFB market (table 3.10.5-3). Professional services are represent more than one-half of total service establishments. Because health services are provided to military households, this sector is not as dependent on Whiteman AFB as would be the case with other service businesses. Warrensburg also has a high proportion of recreation and amusement businesses that attract Whiteman AFB personnel. Warrensburg had 11 recreation businesses representing approximately 10 percent of the service sector as compared to 12 business in Sedalia representing about 5 percent of Sedalia's service establishments.

Table 3.10.5-2
Retail Trade Characteristics — Primary Region of Influence

Retail Businesses	Johnson Co.	Warrensburg	Pettis Co.	Sedalia	Henry Co.	Windsor
Building Supplies/General Merchandise/Apparel/Furniture						
Number	37	26	69	63	46	5
Sales ($1,000)	D	D	D	D	$29,195	D
Food Stores						
Number	18	6	21	19	21	5
Sales ($1,000)	$31,834	$23,572	$41,865	D	$25,091	D
Automotive Dealers/Service Stations						
Number	44	28	59	48	35	9
Sales ($1,000)	$53,378	$46,039	$76,099	$71,388	$28,282	D
Eating/Drinking Places						
Number	49	36	63	52	41	5
Sales ($1,000)	$18,479	$17,353	$19,623	$18,146	$9,205	$427
Drug/Proprietary/Misc. Retail Stores						
Number	39	23	47	40	39	6
Sales ($1,000)	D	D	D	D	$10,613	D
TOTAL						
Number	187	119	259	222	182	30
Sales* ($1,000)	$144,349	$118,619	$211,224	$200,328	$102,386	$10,123

D=Sales not provided to avoid disclosure.
*=Columns do not add because of non-disclosure; however, total sales are correct for the county or city.

Source: U.S. Bureau of the Census, 1987. Census of Retail Trade.

Table 3.10.5-3
Selected Services Characteristics — Primary Region of Influence

Retail Businesses	Johnson Co.	Warrensburg	Pettis Co.	Sedalia	Henry Co.	Windsor
Hotels, etc. Number Receipts ($1,000)	5 D	5 D	9 $3,734	8 D	6 $1,790	0 $0
Personal/Business Services Number Receipts ($1,000)	41 $6,735	19 D	65 $20,269	59 D	33 $2,770	6 D
Automotive/Misc. Repair Services Number Receipts ($1,000)	17 $1,825	9 $962	48 $8,720	40 D	16 D	1 D
Recreation Services Number Receipts ($1,000)	15 $1,386	11 $1,230	16 $2,052	12 $1,821	12 $1,380	3 D
Health/Legal/Social/Professional Services Number Receipts ($1,000)	72 D	61 D	129 D	121 D	51 D	13 D
TOTAL Number Receipts* ($1,000)	150 $29,534	105 $23,500	267 $66,291	240 $55,745	118 $24,096	23 $2,666

D=Receipts not provided to avoid disclosure
*=Columns do not add because of non-disclosure; however, total sales are correct for the county or city.

Source: U.S. Bureau of the Census, 1987. Census of Retail Trade.

3.10.6 Education

Because approximately 90 percent of Whiteman AFB military personnel live in Johnson County, only two school districts, Knob Noster and Warrensburg, receive the vast majority of Whiteman AFB dependent students. Students living on-base attend Knob Noster schools, while off-base students in Johnson County attend Knob Noster and Warrensburg schools. The remaining 10 percent of Whiteman AFB off-base personnel are distributed primarily among communities in two neighboring counties, in Sedalia or La Monte (Pettis County) or Windsor (Henry County).

3.10.6.1 Knob Noster Schools

Enrollment. Knob Noster's total 1991-92 enrollment was 1,871, with Whiteman AFB students (both on- and off-base) constituting almost 72 percent of the total, a slight decline from 1987-88. Total district enrollment has increased by more than 10 percent since 1987. Whiteman AFB off-base students and non-Whiteman AFB students, who

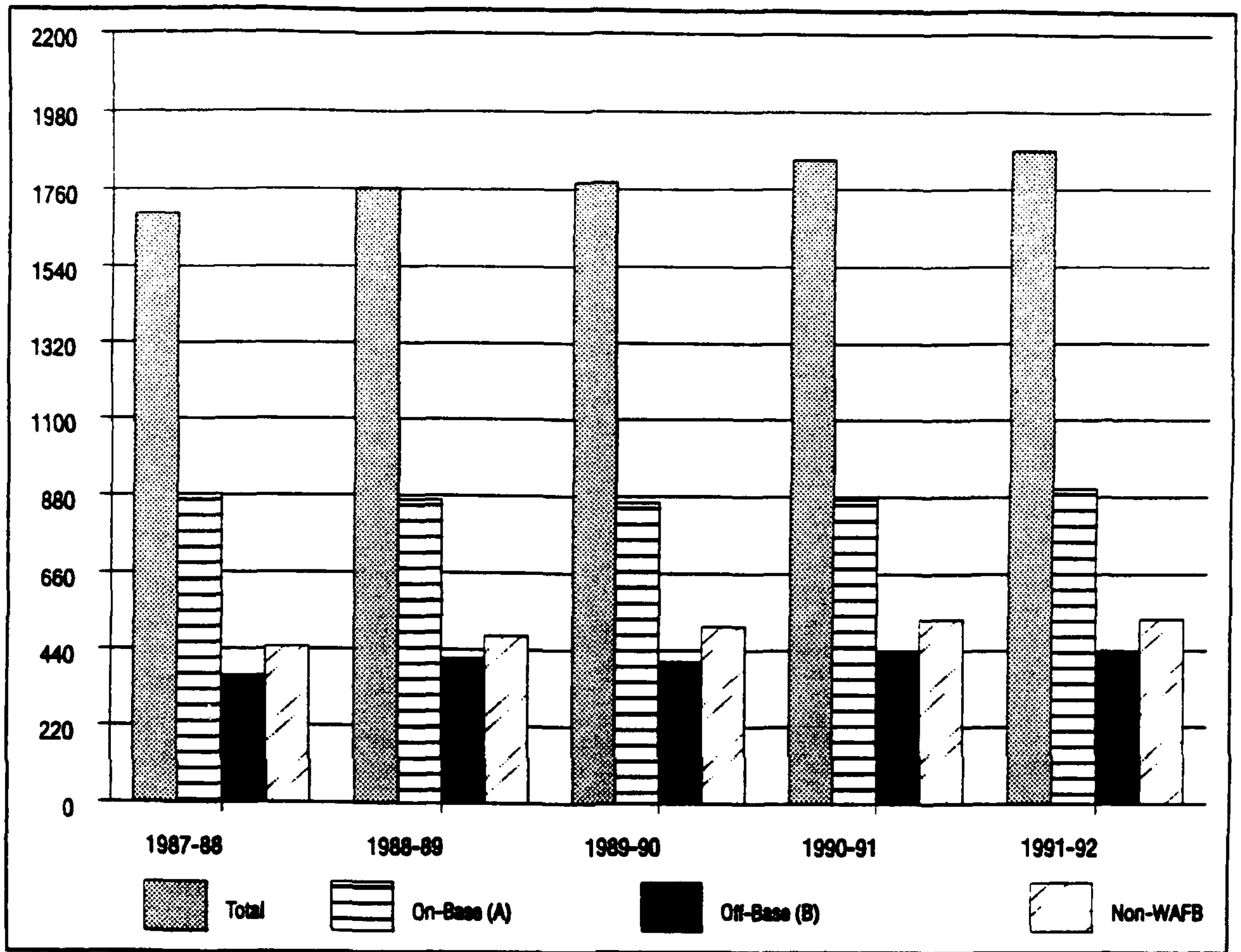


Figure 3.10.6.1-1. Knob Noster School Enrollment by Category, 1987-1992.

come from Knob Noster and the surrounding rural areas, constitute most of the growth, as seen in figure 3.10.6.1-1. Whiteman Elementary, in the Knob Noster District, is currently undergoing construction to expand capacity and student services. This school is attended by grade K-3 students living on-base. Knob Noster Elementary is about five percent over its capacity, while the middle and high schools are filled to 84 and 89 percent of capacity, respectively. As of March 1991, state school officials were forecasting about four percent growth in total enrollment over the next five years (Missouri Department of Education, 1991). However, actual growth to date has exceeded these predictions.

Federal Impact Aid. Knob Noster schools received $1.3 million in federal impact aid in FY91, constituting about 23 percent of their total budget. Of this, $1.2 million (95 percent) is Category A aid for students who live in on-base family housing. The payment per student is approximately $1,430. Payment for the 80 Category A special education students is approximately $2,145 per pupil.

Only five percent of the impact aid (less than $67,000) is classified as Category B aid for dependents of civilian or off-base military personnel. Because off-base students comprise

more than 20 percent of enrollment, Knob Noster is classified as a "Super B" district, allowing receipt of a substantially higher payment per pupil (approximately $185) than non-"Super B" districts are eligible to receive (approximately $35-40 per pupil).

3.10.6.2 Warrensburg Schools

Enrollment. Warrensburg District schools draw students from Warrensburg and the surrounding rural areas. Total enrollment for 1991-92 was 2,617, with Whiteman AFB students constituting 18 percent of the total. There has been an eleven percent overall growth in enrollment in the last five years, with non-Whiteman students accounting for most of the growth in this school district, as seen in figure 3.10.6.2-1. Some Warrensburg school facilities are near or over capacity, and state school officials (as of 1991) were predicting total growth of more than 10 percent for the next five years (Missouri Department of Education, 1991).

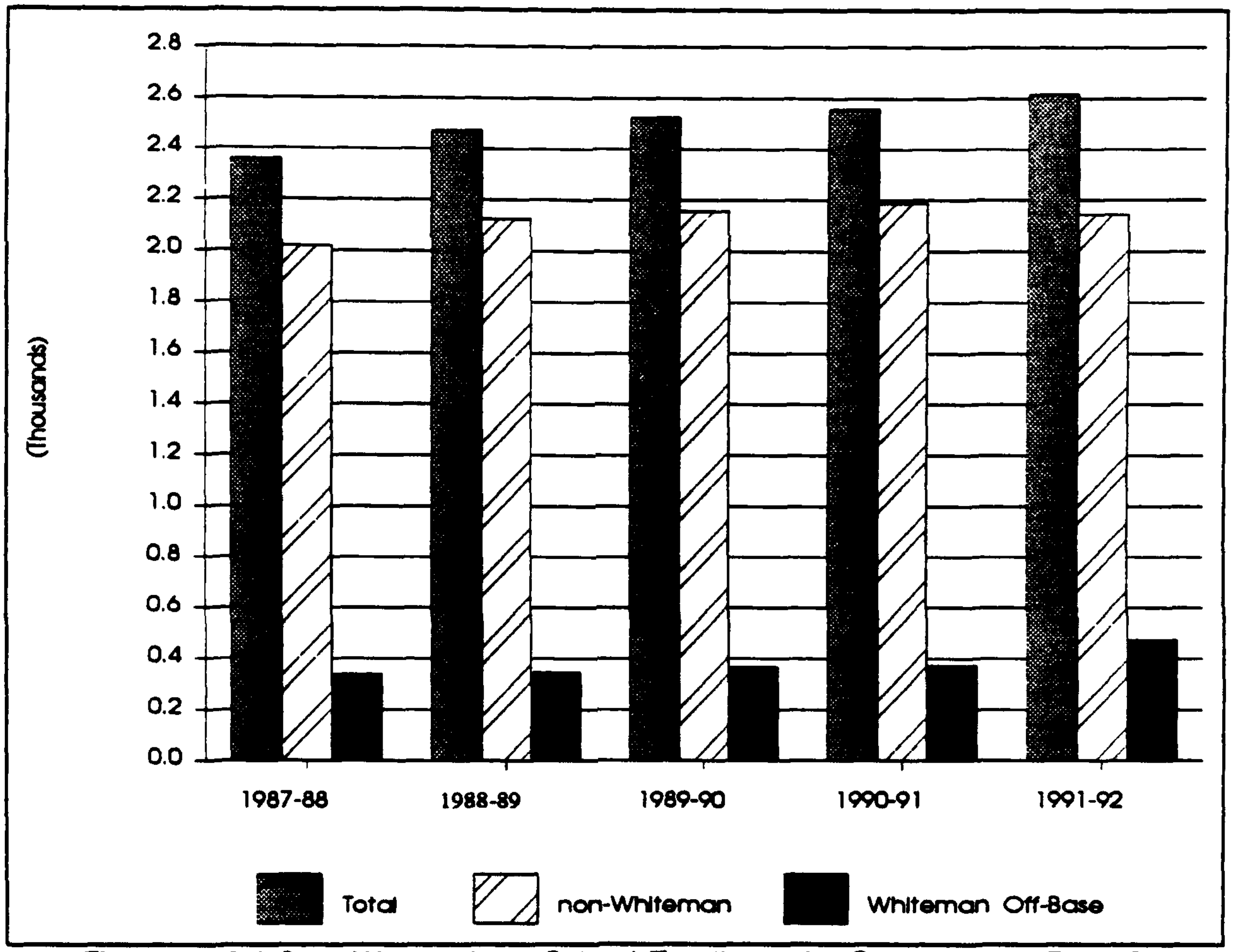


Figure 3.10.6.2-1. Warrensburg School Enrollment by Category, 1987-1992.

Federal Impact Aid. Warrensburg received $18,662 in federal impact aid (Category B only) for the 1990-91 school year, accounting for less than one percent of total revenues.

3.10.6.3 Other School Districts

Windsor, in Henry County, had a 1990-91 enrollment of 744 students, of which approximately 10 percent were Whiteman AFB dependents. As of March 1991, school officials predicted a slight decline in total enrollment over the next five years (Missouri Department of Education, 1991). Windsor School District receives no federal impact aid.

La Monte, in Pettis County, had a 1989-90 total enrollment of 396 students, of which approximately seven percent were dependents of Whiteman AFB personnel. A decline in total enrollment of about eight percent during the next five years was projected in March 1991 by state school officials (Missouri Department of Education, 1991). The La Monte School District received no federal impact aid for the 1989-90 or 1990-91 school years.

3.10.7 Land Use

The land surrounding Whiteman AFB and within the deployment area is generally rural and sparsely populated, consisting of small communities surrounded mostly by agricultural areas. County population densities are substantially lower than the U.S. average, with the exception of Cass County, which is part of the Kansas City MSA. As discussed in section 3.10.2, population growth has been stable or negative in most ROI counties. As shown in figure 3.10.7-1, about 70 percent of the land in the 14-county area is agricultural; less than four percent is urban. Areas adjacent to the LFs and LCFs are used primarily for growing soybeans, corn, and wheat, and for grazing cattle. There is minimal population pressure to develop non-urban land for industrial or residential uses.

In the 1960's, land was acquired by the Air Force for the construction of LFs and LCFs. These lands are owned by the Air Force in a fee simple arrangement. The Air Force also purchased easements because of conventional munitions in the LFs. These easements generally do not allow structures, especially occupied dwellings, to exist within a 1,200-foot radius of each LF. However, a memorandum (USAF, 1962) allowed the possibility of exceptions to the restrictive easement criteria that could allow structures within 670 to 1,200 feet from the center of the missile site; section 3.7.1 discusses the types of structures located within this zone. For a planned explosive blast, the safety zone for occupied dwellings has been estimated at 2,800 feet (HQ SAC/EOD, 1991).

Certain areas, such as those surrounding azimuth markers, cannot be used for crops because of the potential for excavating the HICS, but livestock grazing is not affected.

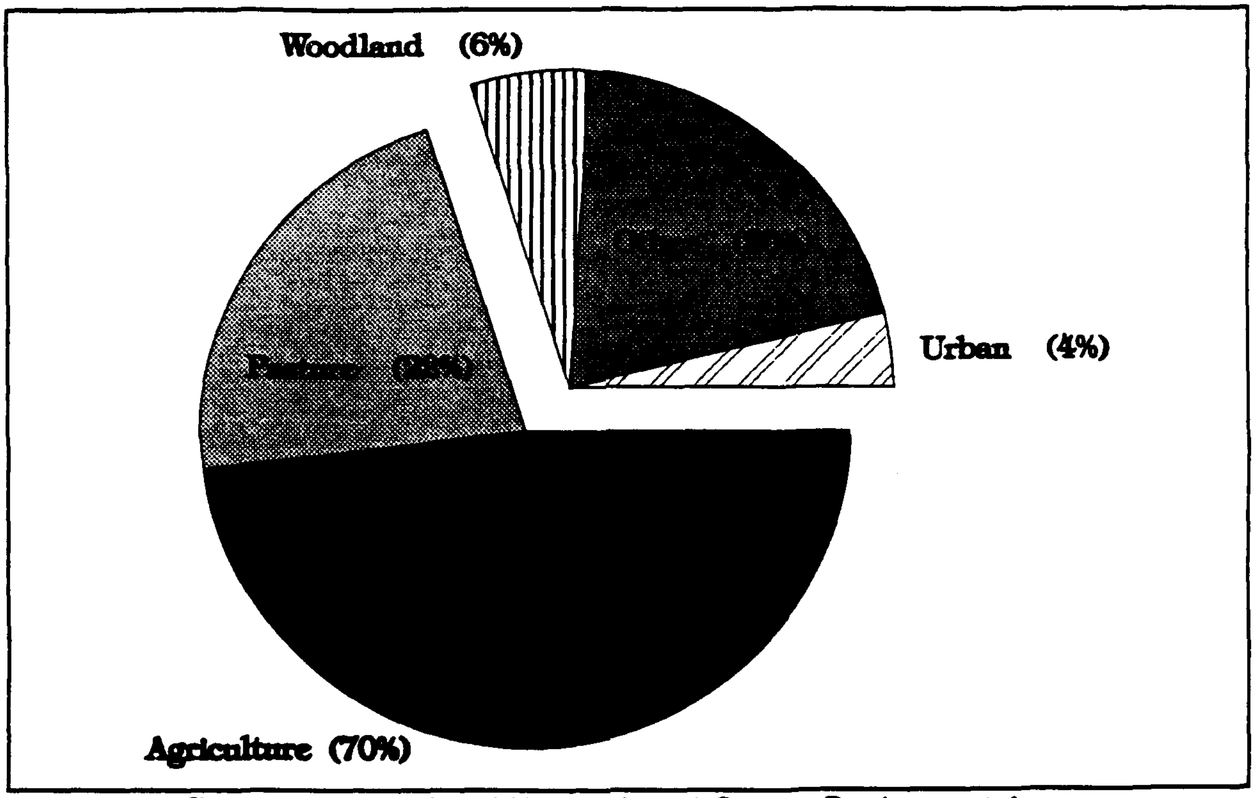


Figure 3.10.7-1. Land Use in the 14-County Deployment Area.

3.10.8 Utilities

The Missouri Public Service Company (MPSC) supplies electricity to Whiteman AFB and one LCF (O-1, located on the MSB), accounting for approximately 1.1 percent of MPSC's total operating revenues. Electricity for LFs and other LCFs is supplied by two other electric companies and five rural electric cooperatives. Table 3.10.8-1 shows the suppliers' total sales and percent of revenue received from the USAF for LFs and LCFs.

The AF portion of electric suppliers' total revenues ranges from less than 1 to 2.6 percent. The individual electric suppliers provide service to a combination of LFs and LCFs from one or more missile squadrons.

3.10.9 Government Finance and Services

Off-base Whiteman AFB military personnel reside primarily in the two communities of Knob Noster and Warrensburg (see table 3.10.1-1), which have the responsibility of providing basic community services including police, fire, recreation, street maintenance, and water and sewage services to their residents. The city of Knob Noster has experienced increases in expenditures and revenues. As shown in table 3.10.9-1, the city has maintained a positive cash flow in two of the three periods analyzed during the 1986-1990 time period. The net cash flow for the city of Warrensburg, while positive, has been declining since 1986, primarily as a result of capital improvement expenditures.

Table 3.10.8-1. LF and LCF Electricity Consumption and Suppliers		
Supplier	**1990 Total Sales ($000)**	**% of Sales to USAF (Approx.)**
Kansas City Power and Light	761,157	< 1.0
Missouri Public Service Company	241,990	< 1.0*
Osage Valley Electric Company	12,696	1.4
Central Missouri Electric Cooperative	8,191	2.6
CO-MO Electric Cooperative	15,736	1.1
SAC Osage Electric Cooperative	6,041	2.1
Union Electric Cooperative	1,939,171	< 1.0
West Central Electric Cooperative	9,196	1.9

*Does not include O-1.
Sources: 351 SPTG/DEU, 1991; Electric Cooperatives and Companies, 1991, personal communications.

Warrensburg's current 1991-1992 budget provides a fairly ambitious five-year, $14.6 million capital improvement program (CIP) focused primarily on sewer and environmental improvement projects. The CIP is flexible and can respond to changing service needs and economic conditions. The cities of Knob Noster and Warrensburg currently have little or no debt service expense in their general operating budgets.

Table 3.10.9-1. Government Finance — Knob Noster and Warrensburg			
	1986	**1988**	**1990**
Knob Noster			
Expenditures	401,447	395,026	456,989
Revenues	407,601	432,221	432,681
Net Cash Flow	6,154	37,195	(24,308)
Warrensburg			
Expenditures	2,007,313	2,312,051	2,649,000
Revenues	2,974,786	3,085,806	3,101,000
Net Cash Flow	967,473	773,755	452,000

Source: Fiscal Impact Analysis, Whiteman AFB, and City of Knob Noster, 1992.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

The main purpose of an environmental impact statement (EIS) is to identify the potential for significant adverse impacts of a federally proposed action and its alternatives. Accordingly, this analysis of the proposed action and alternatives has focused on identifying types of impacts and estimating their potential significance. This chapter evaluates the potential impacts of the Minuteman II (MM II) action, whereas chapter 5 discusses the potential cumulative impacts of the proposed action and its alternatives in conjunction with other reasonably foreseeable actions.

For this EIS, a structured, integrated process was used to identify the possible environmental effects arising from activities associated with implementation of the proposed action or alternatives. The likely major elements of the proposed action and alternatives were identified, and the major activities associated with these elements were evaluated. For each major activity, the types of effects that activities could generate were defined in various environmental resource areas. This process enabled the identification of the effects in one resource that are generated by an activity (direct effects) and also by an activity's effects on another resource (indirect, secondary, or higher order effects). Questions generated from the activity-effect process evaluation were used to focus the analysis. Figures 4.0-1 through 4.0-4 served as a framework to scope the subsequent research and analysis necessary to determine the likelihood, magnitude, and significance of impact. Figure 4.0-1 includes examples of questions asked to help focus the study; questions are inferred but not shown in the other cause-effect-questions (C-E-Q) networks. The types of impacts were classified as negligible (unlikely occurrence and/or insignificant effect) or adverse. The analysis focused on those impacts that were adverse to determine whether the impacts were significant or insignificant. Beneficial impacts were also evaluated but are not shown on the C-E-Q figures.

As specified in section 3.0, those resources that would not be affected by the alternative actions were not described and those that would not likely be affected were not described in the same level of detail as those that would likely be affected. The same rationale holds true for the analysis of potential environmental impacts in this chapter.

The significance of an environmental impact depends on several factors, including the following:

- The magnitude—the size of the change in the baseline condition.
- The likelihood—the chance of the change occurring if the action is taken.
- The context—the setting or frame of reference. This has both spatial (geographic) and temporal (timeframe) meanings: the significance of an impact can vary in local vs. regional vs. national vs. global contexts. Similarly, impact significance can be different in the short term vs. the long term.

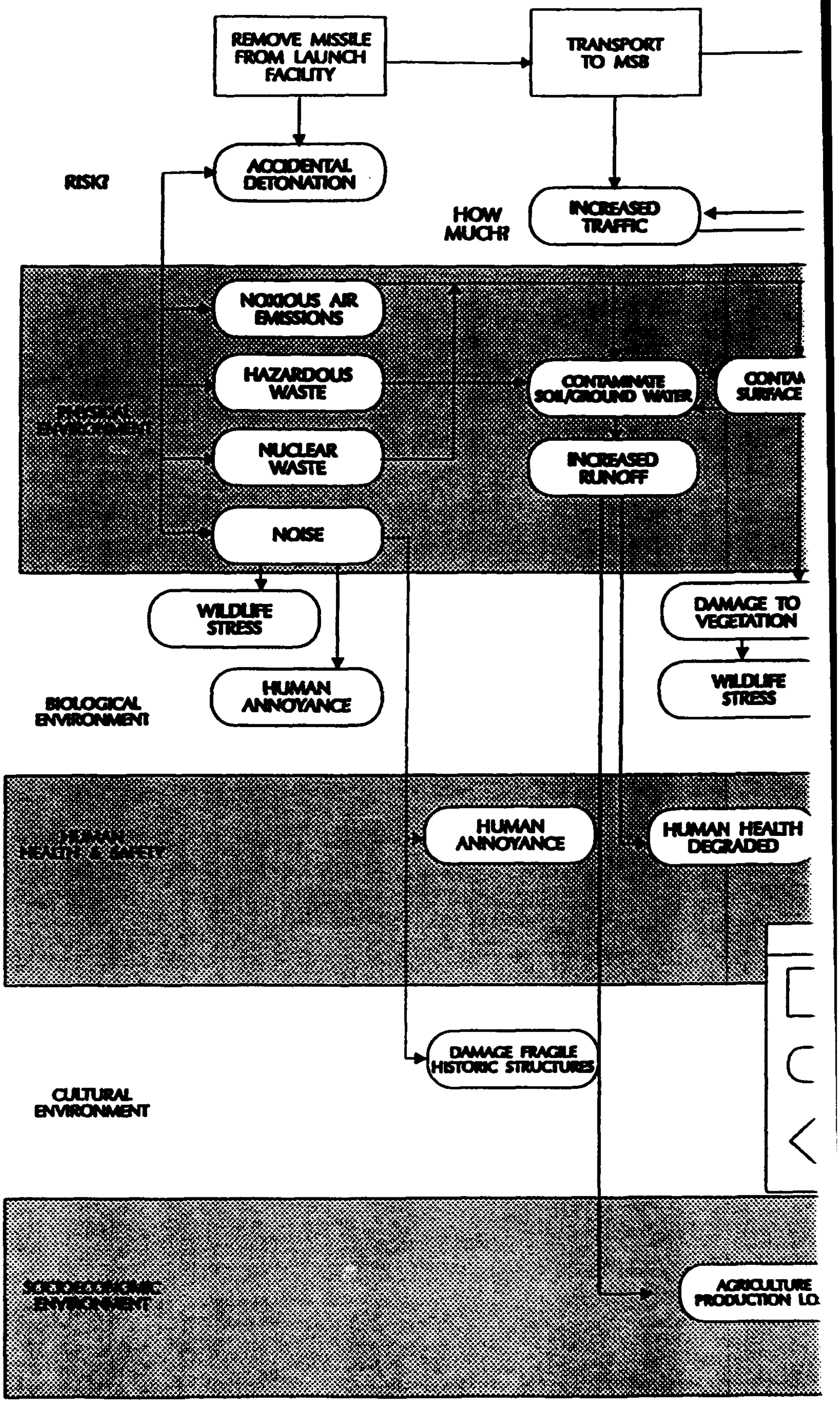
- The intensity—the severity of an impact (as the term is used by the Council on Environmental Quality (CEQ) at 40 CFR 1508.27). Included in this factor are considerations of the following:

  – The severity of adverse effect components within overall impacts that have both beneficial and adverse components.
  – The degree of adverse effect on specific resources or concerns (such as public health, endangered species, historic places).
  – The potential for violation of laws or regulations.
  – The potential of this action as precedent.
  – The degree of uncertainty and unknowns.
  – The degree of potential controversy.
  – The uniqueness of the setting.
  – The relation to other actions with potential cumulative (additive) effects.

- The permanence, the reversibility of the impact, and the resilience of the affected resource.

These factors were considered for each resource area and used to formulate significance criteria to serve as guidelines for categorizing the significance of impacts. These criteria, summarized in table 4.0-1, take into account all the relevant significance factors. The estimated environmental impacts of the proposed action and alternatives were evaluated and then compared to the significance criteria to determine the potential significance of the predicted impacts. Table 4.0-2 presents a summary of the significance of the predicted impacts. The results of the impact analysis are presented in the following sections.

1


REMOVE MISSILE FROM LAUNCH FACILITY
TRANSPORT TO MSB
RISK?
ACCIDENTAL DETONATION
HOW MUCH?
INCREASED TRAFFIC
PHYSICAL ENVIRONMENT
NOXIOUS AIR EMISSIONS
HAZARDOUS WASTE
CONTAMINATE SOIL/GROUND WATER
NUCLEAR WASTE
INCREASED RUNOFF
NOISE
WILDLIFE STRESS
DAMAGE TO VEGETATION
WILDLIFE STRESS
BIOLOGICAL ENVIRONMENT
HUMAN ANNOYANCE
HUMAN HEALTH & SAFETY
HUMAN ANNOYANCE
HUMAN HEALTH DEGRADED
CULTURAL ENVIRONMENT
DAMAGE FRAGILE HISTORIC STRUCTURES
SOCIOECONOMIC ENVIRONMENT
AGRICULTURE

2

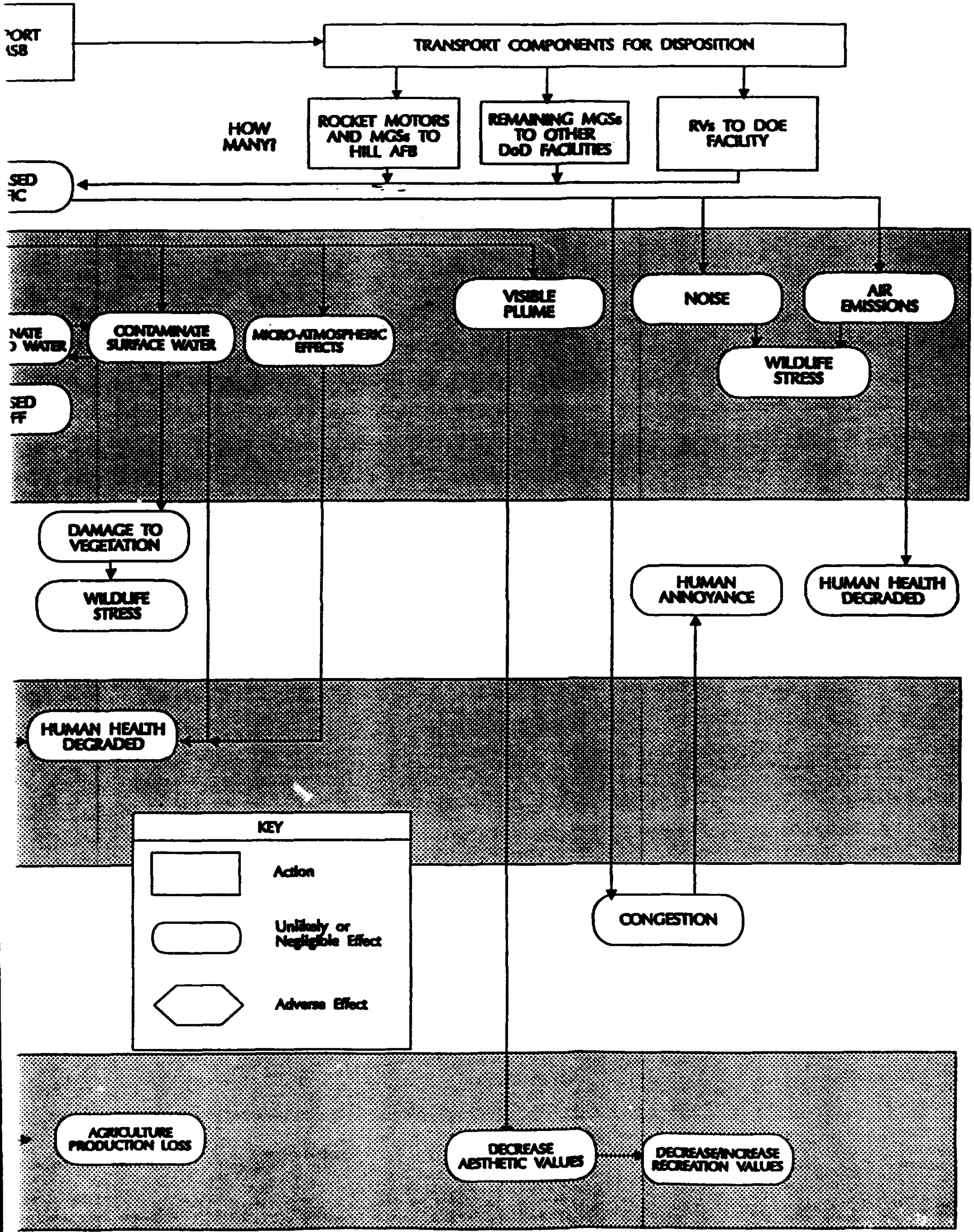
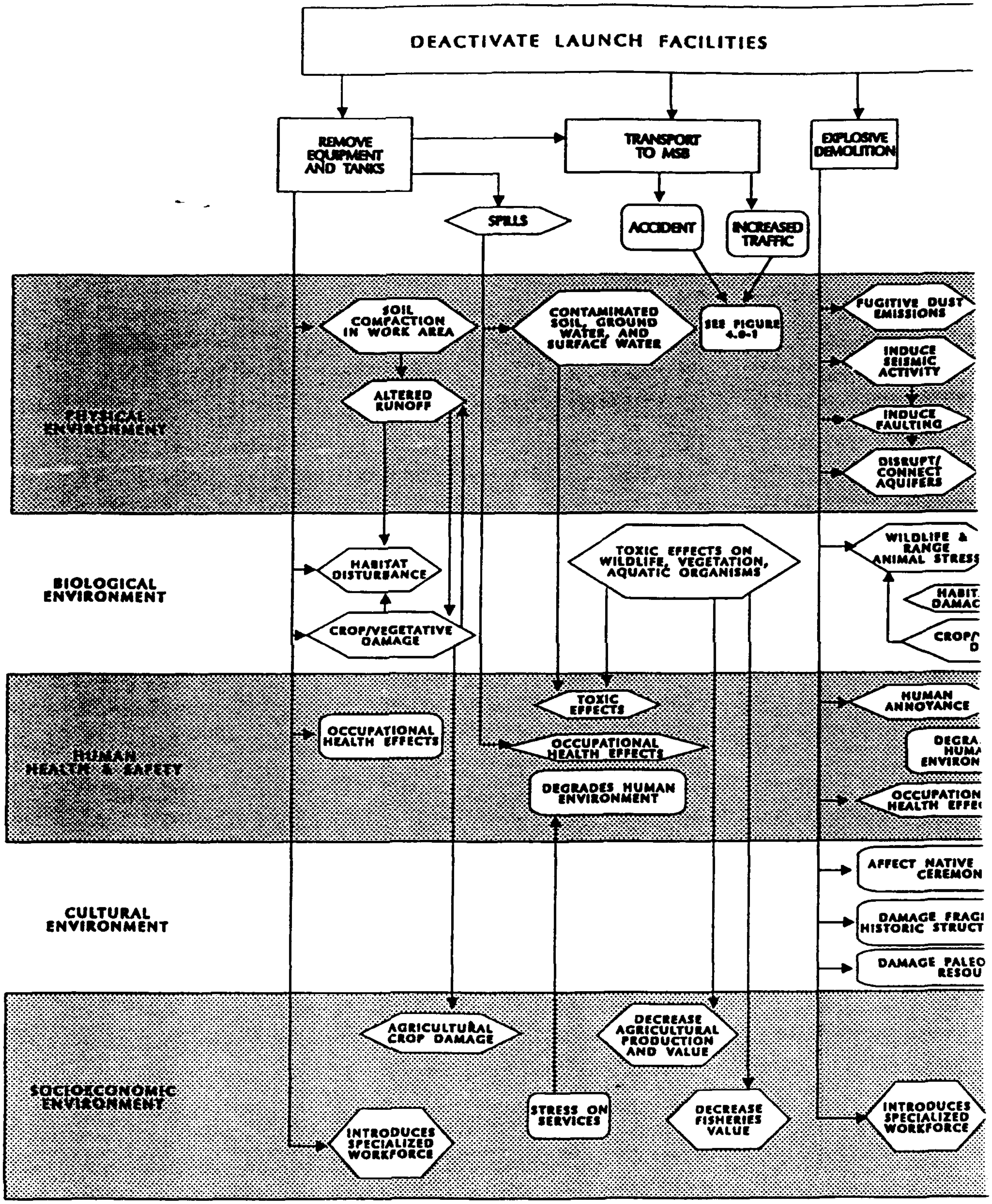


Figure 4.0-1 Cause-Effect-Questions Network for the Proposed Action and Alternatives

①


DEACTIVATE LAUNCH FACILITIES
REMOVE EQUIPMENT AND TANKS
TRANSPORT TO MSB
EXPLOSIVE DEMOLITION
SPILLS
ACCIDENT
INCREASED TRAFFIC
PHYSICAL ENVIRONMENT
SOIL COMPACTION IN WORK AREA
CONTAMINATED SOIL, GROUND WATER, AND SURFACE WATER
SEE FIGURE 4.0-1
FUGITIVE DUST EMISSIONS
INDUCE SEISMIC ACTIVITY
ALTERED RUNOFF
INDUCE FAULTING
DISRUPT/ CONNECT AQUIFERS
BIOLOGICAL ENVIRONMENT
HABITAT DISTURBANCE
TOXIC EFFECTS ON WILDLIFE, VEGETATION, AQUATIC ORGANISMS
WILDLIFE & RANGE ANIMAL STRESS
CROP/VEGETATIVE DAMAGE
HUMAN HEALTH & SAFETY
TOXIC EFFECTS
HUMAN ANNOYANCE
OCCUPATIONAL HEALTH EFFECTS
OCCUPATIONAL HEALTH EFFECTS
DEGRADES HUMAN ENVIRONMENT
CULTURAL ENVIRONMENT
SOCIOECONOMIC ENVIRONMENT
AGRICULTURAL CROP DAMAGE
DECREASE AGRICULTURAL PRODUCTION AND VALUE
STRESS ON SERVICES
DECREASE FISHERIES VALUE
INTRODUCES SPECIALIZED WORKFORCE
INTRODUCES SPECIALIZED WORKFORCE

2

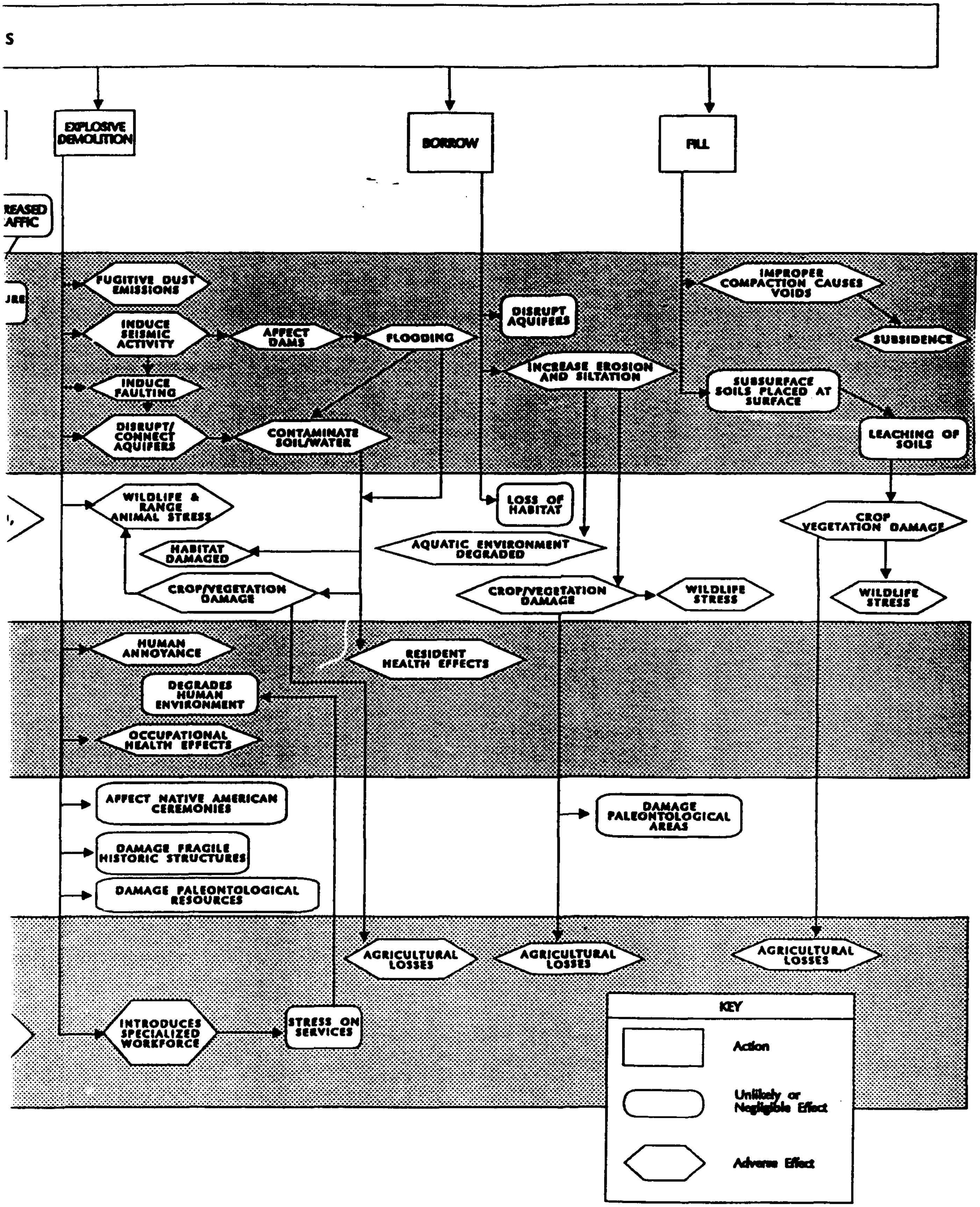
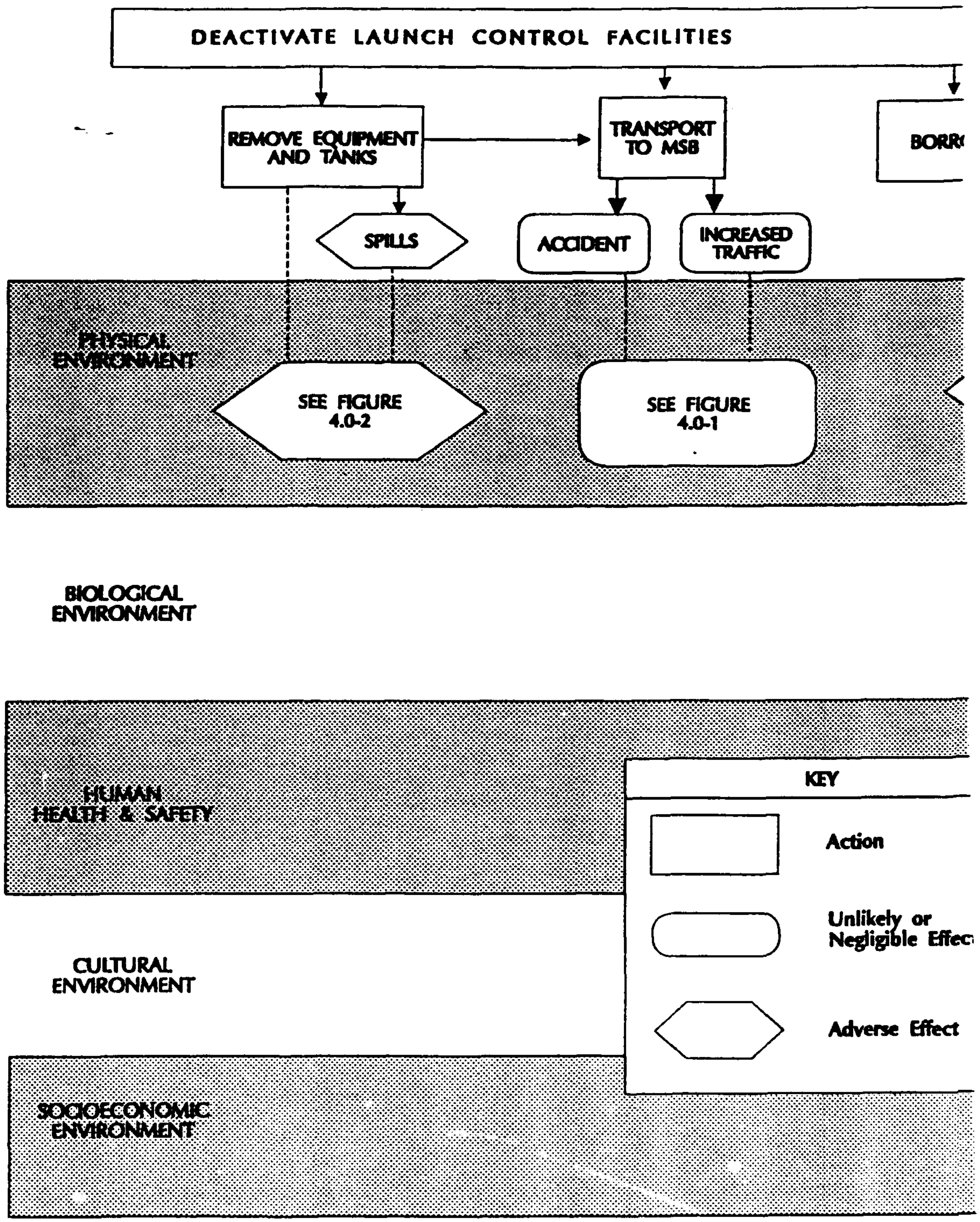


Figure 4.0-2 Cause-Effect-Questions Network for the Proposed Action and Alternatives (Deactivation of Launch Facilities)

(1)


DEACTIVATE LAUNCH CONTROL FACILITIES
REMOVE EQUIPMENT AND TANKS
TRANSPORT TO MSB
SPILLS
ACCIDENT
INCREASED TRAFFIC
PHYSICAL ENVIRONMENT
SEE FIGURE 4.0-2
SEE FIGURE 4.0-1
BIOLOGICAL ENVIRONMENT
HUMAN HEALTH & SAFETY
CULTURAL ENVIRONMENT
SOCIOECONOMIC ENVIRONMENT
KEY
Action
Adverse Effect

2

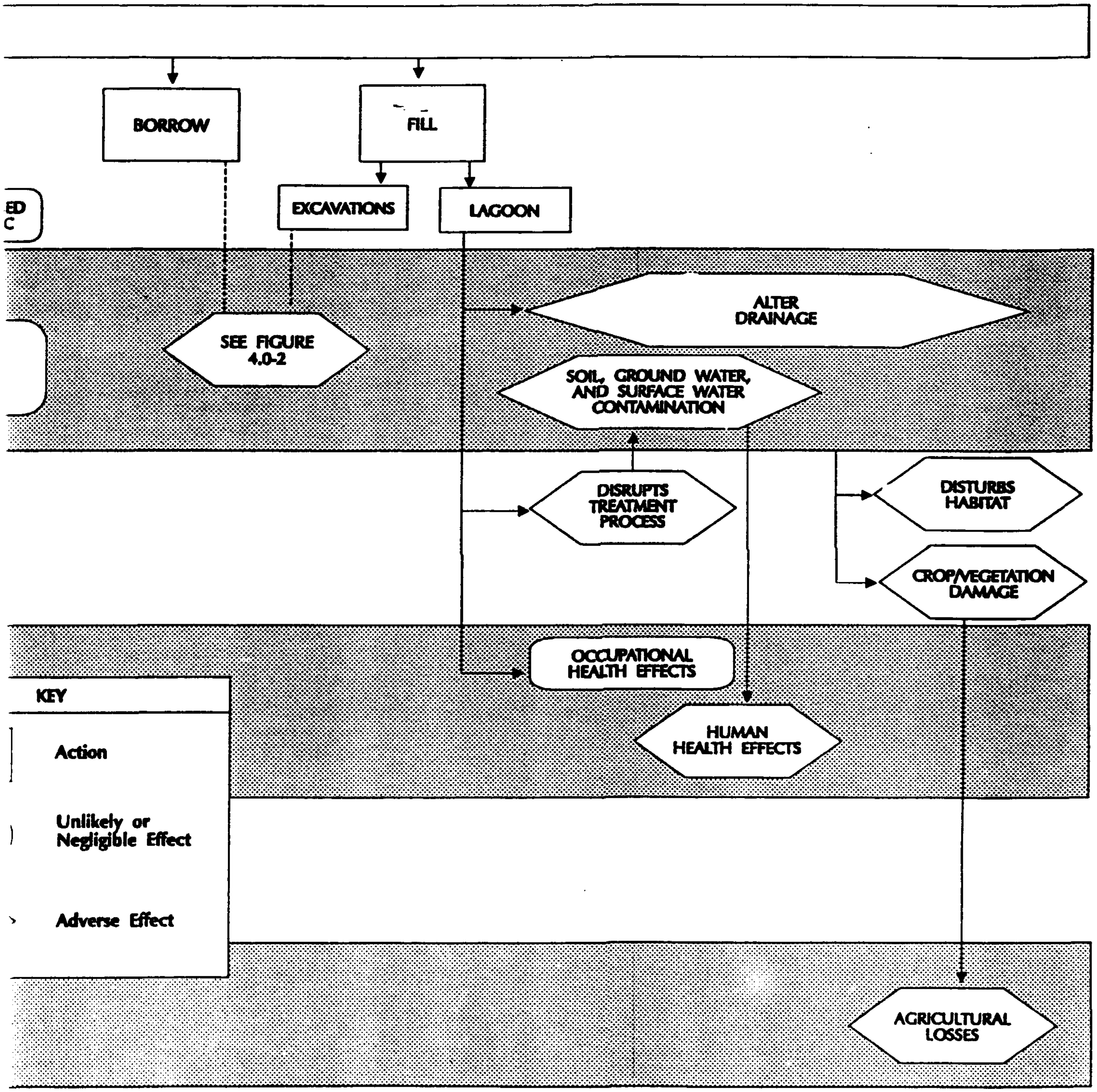
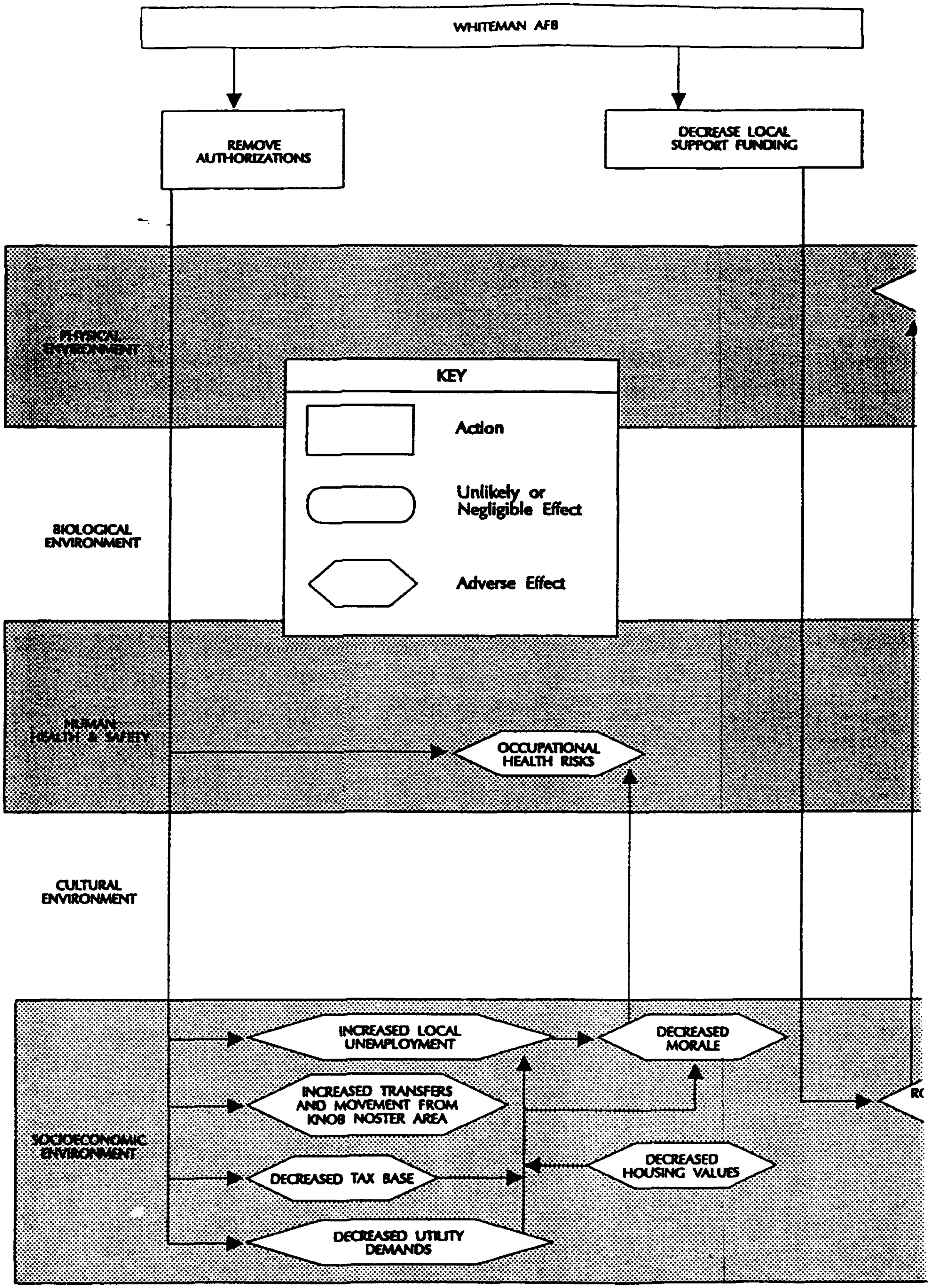


Figure 4.0-3 Cause-Effect-Questions Network for the Proposed Action and Alternatives (Deactivation of Launch Control Facilities)

(1)



WHITEMAN AFB
REMOVE AUTHORIZATIONS
DECREASE LOCAL SUPPORT FUNDING
PHYSICAL ENVIRONMENT
KEY
Action
Unlikely or Negligible Effect
Adverse Effect
BIOLOGICAL ENVIRONMENT
HUMAN HEALTH & SAFETY
OCCUPATIONAL HEALTH RISKS
CULTURAL ENVIRONMENT
SOCIOECONOMIC ENVIRONMENT
INCREASED LOCAL UNEMPLOYMENT
DECREASED MORALE
INCREASED TRANSFERS AND MOVEMENT FROM KNOB NOSTER AREA
DECREASED TAX BASE
DECREASED HOUSING VALUES
DECREASED UTILITY DEMANDS

(2)

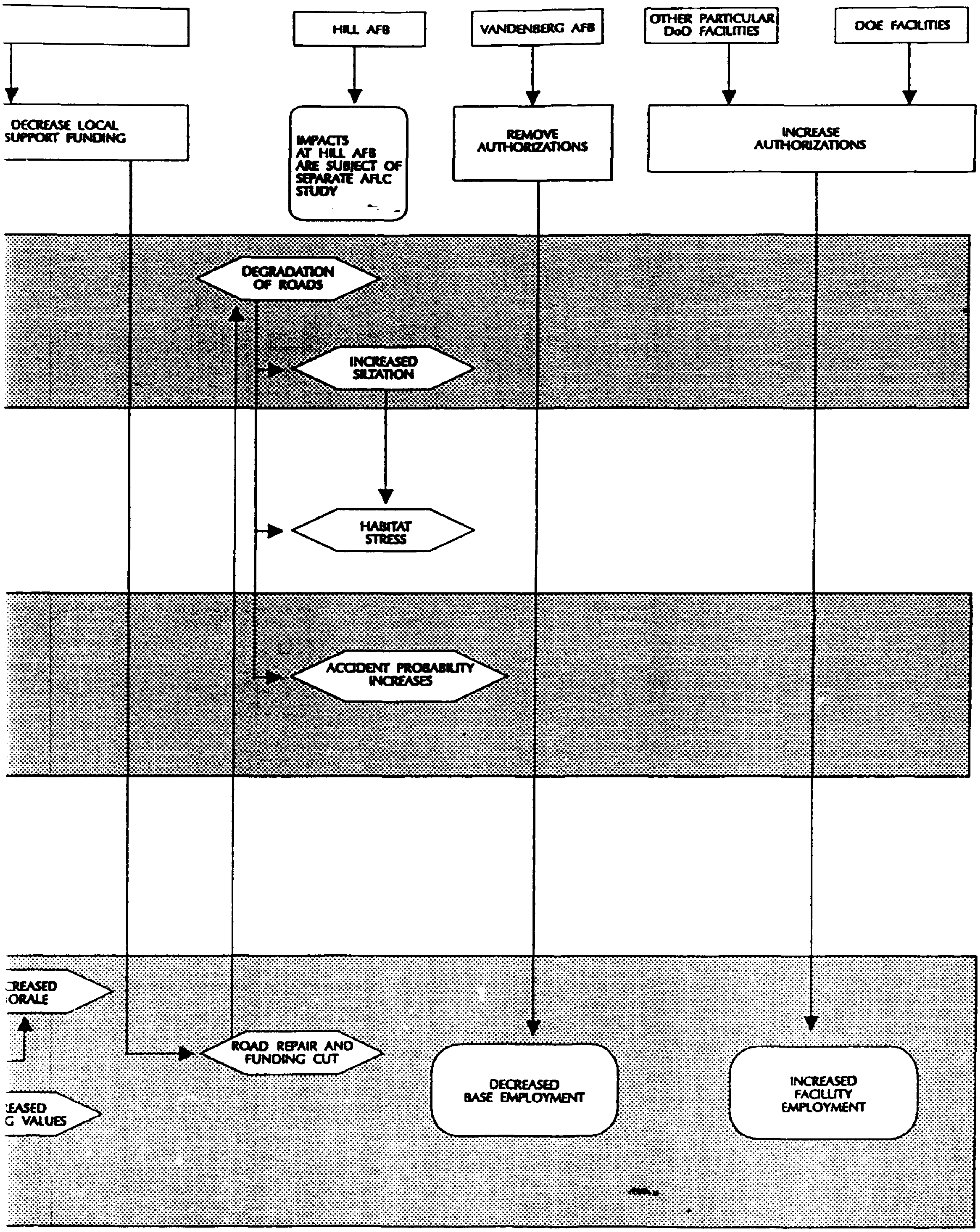


Figure 4.0-4 Cause-Effect-Questions Network for the Proposed Action and Alternatives (Deactivation of Personnel and Base Facilities)

TABLE 4.0-1
Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives

POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
AIR			
Emissions from aircraft.	Increases in criteria pollutant emissions, but no violation of standards.	Increase in criteria pollutant emissions and violation of standards.	Reduction in baseline emissions.
Emissions from on-base vehicular traffic.			
Fugitive dust, vehicle emissions, and launcher demolition emissions in the deployment area.			
GEOLOGY			
Ground motion effects on structure and occupants from explosive demolition.	Ground wave attenuation causes ground movement and no damage.	Ground wave attenuation causes ground movement and damage to structures or contents, such as broken dishes or cracked plaster.	Decrease seismic motion below current levels.
Slumping of unstable terrain from seismic activity associated with explosive demolition.	Slumping triggered by explosive demolition with no injuries or irreparable damage to lands.	Slumping triggered by explosive demolition that causes injuries or irreparable damage to land.	Stabilize, without slumping, areas prone to slumping.
Activation of faults from demolition seismic activity.	No or minor (<2.5 on Richter scale, <III on modified Mercalli scale) earthquakes produced from demolition.	Demolition causes an earthquake of magnitude above 2.5 on Richter scale or III on modified Mercalli scale.	Decrease probability of future earthquakes without causing a destructive earthquake.
Excavation of fill.	Slight alteration of physical parameters, causing minor movement or settlement and no visible loss of vegetation and wildlife.	Alteration of physical parameters of soils causing loss of vegetation and decrease in suitable wildlife habitat.	Improvement of soil stability or productivity.
Soil compaction and erosion in deployment area.	Slight alteration of physical parameters causing minor movement or settlement and no visible loss of vegetation and wildlife.	Alteration of physical parameters of soils causing loss of vegetation and decrease in suitable wildlife habitat.	Improvement of soil stability.

TABLE 4.0-1 Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives (Continued)			
POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
WATER			
Excavation effects on aquifer. Launcher headworks demolition effects on aquifer.	Recharge or yield of potable aquifer is not decreased.	Recharge of potable aquifer is decreased.	Recharge rate is increased with no degradation in water quality.
Launcher headworks demolition effects on water wells.	No measurable change in water yield accounting for seasonal variation.	A measurable change in water yield accounting for seasonal variation.	Increased yield from well.
Surface- and ground-water quality.	Parameter-specific quality standard is not exceeded.	Parameter-specific quality standard is exceeded.	Water quality is improved.
Surface water quantity.	No diversion of streams or waterbodies, leakage of reservoirs, or decrease in flow rate.	Diversion of streams or water bodies, leakage of reservoirs, or decrease in flow rate.	Improvement of current stream channel, water body boundary, or reservoir capacity.
BIOLOGY			
Siltation of streams from increased erosion and runoff.	Up to less than 2 percent reduction in important commercial & recreational aquatic resources. No impacts on threatened, endangered, or rare aquatic species.	More than 2 percent reduction in important commercial & recreational aquatic resources or any decrease in rare, threatened, or endangered aquatic species.	Improvement in aquatic habitat.
Startle effect on wildlife and domestic animals.	One startle incident for limited population within the site area (approximately 1 mile). No loss of or reduced reproductive success for threatened, endangered, and candidate species.	Startling of a large population of wildlife; more than one startle of previously startled wildlife; startling of threatened, endangered, & candidate species with no loss or reduced reproductive success.	Improved reproductive success.
Habitat excavated for fill.	No loss and minimal degradation of habitat.	Loss of habitat or degradation sufficient to cause indigenous population to leave area.	Improvement of habitat for indigenous species.
Crop/vegetation damage from erosion or contamination migrating from site.	Loss of up to 5 percent of crops within 1-mile radius of site and no loss of critical habitat.	Loss of more than 5 percent of crops within 1-mile radius of site or loss of critical habitat.	Yield of crops increased or increase in critical habitat.

TABLE 4.0-1
Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives (Continued)

POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL			
Loss of LFs and LCFs as historic structures.	All LFs and LCFs destroyed, but documentation prepared to describe their function, as well as to discuss the historic nature of the MM II system at Whiteman AFB.	All LFs and LCFs destroyed, and no documentation prepared to preserve the existence of this historical system.	Retain at least one LF and/or LCF as a historic structure and record, prepare, and display information to support historic rol' 'he MM II system pla, d.
Damage to fragile historic structures and artifacts from explosive demolition.	NHRP, prehistoric, paleontological, or Native American sites minimally disturbed, and relative importance is minimal.	NHRP, prehistoric, paleontological, or Native American sites are partially affected or are minimally ''isturbed and are of moderate to high importance.	Discovery and documentation of new historic, prehistoric, paleontological, or Native American site.
Disruption of Native American ceremonies or activities.	No ceremonies or activities disrupted.	Disruption of a ceremony or activity.	Removal of structures within sight of ceremonial areas or other activity sites.
Archaeological or paleontological resources uncovered by ground disturbance during borrow excavations.	No damage to site.	Damage to site without documenting archaeology.	Unearthing and protecting a site with adequate archaeological documentation.
PUBLIC HEALTH AND SAFETY/HAZARDOUS WASTE			
Removal of asbestos-containing materials, PCBs, and other hazardous materials from deployment area—effect on nearby residents.	Removal of hazardous compounds with no public exposure to concentrations above health-based levels (same as beneficial).	Public exposure to hazardous materials at concentrations above health-based levels during removal or from materials not recovered.	Removal of hazardous materials with no public exposure to concentrations above health-based levels.

TABLE 4.0-1
Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives (Continued)

POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
PUBLIC HEALTH AND SAFETY/HAZARDOUS WASTE (Continued)			
Removal of asbestos-containing materials , PCBs, and other hazardous materials—effect on workers.	Removal of hazardous compounds while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels (same as beneficial).	Removal of hazardous compounds accompanied by worker exposure to concentrations above health-based levels, or accidents.	Removal of hazardous compounds while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels.
Increased solid waste generation and disposal.	Material for disposal does not exceed capacities for existing facilities in area, or new facility will be on line with sufficient capacity for waste generated.	Material for disposal will exceed capacities for existing facilities in area, or new facility will not be finished with sufficient capacity for waste generated.	Waste quantity decreases from what is currently handled.
Removal of USTs-effects on workers.	Removal of USTs while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels (same as beneficial).	Removal of USTs accompanied by worker exposure to fumes at concentrations above health-based levels, or accidents.	Removal of USTs while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels.
Removal of USTs-effects on soil and ground water.	No contamination found.	Soil contamination found.	Removal of USTs decreases contamination risk.
Explosive demolition of launcher and cutting of metal covered with lead-based paint.	Public & workers not exposed to lead fumes or lead particulate matter at concentrations above health-based levels (same as beneficial).	Public and workers exposed to lead fumes or lead particulate matter at concentrations above health-based levels.	Public and workers not exposed to lead fumes or lead particulate matter at concentrations above health-based levels.

TABLE 4.0-1 Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives (Continued)			
POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
PUBLIC HEALTH AND SAFETY/HAZARDOUS WASTE (Continued)			
Draining of fuels, coolants, and lubricants-workers.	Removal of fluids while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels (same as beneficial).	Removal of fluids accompanied by worker exposure to concentrations above health-based levels, or accidents.	Removal of fluids while wearing suitable protective clothing and following health and safety requirements with no worker exposure to concentrations above health-based levels.
Generation, storage, and disposal of hazardous waste.	Amount of hazardous waste normally generated remains constant or increases only slightly (<10 percent) with no disposition problems concerning type of waste or quantity of waste.	Amount of hazardous waste normally generated increases more than 10 percent, or disposition problems occur because of type or quantity of waste.	The amount of hazardous waste generated decreases.
NOISE			
Aircraft noise.	Exposure of noise-sensitive receptors to levels less than 65 L_{dn}.	Exposure to noise levels greater than 65 L_{dn}.	Noise level decreases below current L_{dn}.
Explosive demolition noise .	Continued exposure of noise-sensitive receptors to noise levels less than 5 dBA over ambient values.	Continued exposure of noise-sensitive receptors to noise levels more than 5 dBA over ambient values.	Noise decreases below current levels.
Traffic noise to and from deployment area.	Average noise levels increase by less than 5 percent.	Average noise levels increase by more than 5 percent.	Traffic decreases and noise levels decrease.
TRANSPORTATION			
Traffic to and from deployment area.	Level of service for main and secondary roads remains at existing levels.	Level of service decreases one level or more for main or secondary roads.	Level of service improves one or more levels.
Accidents.	Accident rate varies by less than 2 percent.	Accident rate increases by more than 2 percent.	Accident rate decreases by more than 2 percent.
Deployment area road upkeep and funding.	Funding for repair/ improvement of roads varies by less than 2 percent.	Funding for repair/ improvements of roads decreases by more than 2 percent and traffic does not decrease.	Funding for repair/improvement of roads increases by more than 2 percent.

TABLE 4.0-1 Criteria for Significance of Potential Impacts of the Proposed Action and Alternatives (Continued)			
POTENTIAL IMPACTS	ADVERSE		BENEFICIAL
	INSIGNIFICANT	SIGNIFICANT	
SOCIOECONOMICS			
Employment opportunities from deactivation process.	Local employment varies by less than 2 percent.	Local employment decreases by more than 2 percent.	Local employment increases more than 2 percent with minimal stress on services.
Population change—impact on services.	Population varies by less than 2 percent.	Population decreases by more than 2 percent in areas of decreasing population or with average annual growth below 2 percent.	Population increases by more than 2 percent with minimal stress on services.
School enrollment.	School population varies by less than 2 percent.	School population decreases by more than 2 percent.	School population increases by more than 2 percent with minimal stress on services.
Federal Impact Aid to schools.	Revenues vary by less than 2 percent.	Revenues decrease by more than 2 percent.	Revenues increase by more than 2 percent.
Deployment area road upkeep and funding.	Funding for repair and improvement of roads varies by less than 2 percent.	Funding for repair and improvements of roads decreases by more than 2 percent.	Funding for repair and improvement of roads increases by more than 2 percent.
Housing.	Vacancy rate varies by less than 2 percent.	Vacancy rate increases by more than 2 percent.	Vacancy rate decreases by more than 2 percent with minimal stress on services.
Land use.	Degradation or improvement of land use is not noticeable.	Degradation of land such that it could no longer be used for its current or proposed land use.	Land use is noticeably improved. Crop yields, property values, or other economic measures increase.
Utilities—effects on rural electrification cooperatives.	Revenues vary by less than 2 percent.	Revenues decrease by more than 2 percent.	Revenues increase by more than 2 percent.

Table 4.0-2

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated)[2]	Missile Removal and System Shutdown
AIR				
Emissions from aircraft	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant
Emissions from on-base vehicular traffic	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Insignificant LT: Beneficial and locally insignificant	Insignificant
Fugitive dust, vehicle emissions, and launcher demolition emissions in the deployment area	ST: Adverse and locally insignificant LT: Beneficial and locally insignificant	Insignificant	ST: Adverse and locally insignificant LT: Beneficial and locally insignificant	Insignificant
GEOLOGY				
Ground motion effects on structure and occupants from explosive demolition	ST: Adverse and locally insignificant LT: Not applicable	Not applicable	ST: Adverse and locally insignificant LT: Not applicable	Not applicable
Slumping of unstable terrain caused by seismic activity associated with explosive demolition	Insignificant	Not applicable	Insignificant	Not applicable
Activation of faults from demolition seismic activity	Insignificant	Not applicable	Insignificant	Not applicable
Excavation of fill	ST: Adverse and locally insignificant LT: Insignificant	Not applicable	ST: Adverse and locally insignificant LT: Insignificant	Not applicable
Soil compaction and erosion in deployment area	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 4.0-2 (Continued)

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated)[2]	Missile Removal and System Shutdown
WATER				
Excavation effects on aquifer	Insignificant	Not applicable	Insignificant	Not applicable
Launcher headworks demolition effects on aquifer	Adverse and locally significant, regionally insignificant	Not applicable	Adverse and locally significant, regionally insignificant	Not applicable
Launcher headworks demolition effects on water wells	Adverse and locally significant, regionally insignificant	Not applicable	Adverse and locally significant, regionally insignificant	Not applicable
Surface- and ground-water quality	Insignificant	Insignificant	Insignificant	Insignificant
Surface-water quantity	ST: Adverse and locally significant, regionally insignificant LT: Insignificant	Insignificant	ST: Adverse and locally significant, regionally insignificant LT: Insignificant	Insignificant
BIOLOGY				
Siltation of streams from increased erosion and runoff	Insignificant	Insignificant	Insignificant	Insignificant
Startle effect on wildlife and domestic animals	Insignificant	Insignificant	Insignificant	Insignificant
Habitat excavated for fill	Insignificant	Not applicable	Insignificant	Not applicable
Crop/vegetation damage from erosion or contamination migrating from site	Insignificant	Insignificant	Insignificant	Insignificant
CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL				
Damage to fragile historic structures and artifacts from explosive demolition	ST: Insignificant LT: Not applicable	Not applicable	ST: Insignificant LT: Not applicable	Not applicable
Loss of LFs and LCFs as historic structures	Insignificant with proposed mitigation	Not applicable	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 4.0-2 (Continued)

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated[2])	Missile Removal and System Shutdown
CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL (Continued)				
Disruption of Native American ceremonies or activities	Insignificant	Insignificant	Insignificant	Insignificant
Archaeological or paleontological resources uncovered by ground disturbance during borrow excavations	Beneficial and locally insignificant	Not applicable	Beneficial and locally insignificant	Beneficial and locally insignificant
HUMAN HEALTH AND SAFETY/HAZARDOUS WASTE				
Removal of asbestos-containing materials, PCBs, and other hazardous materials from deployment area—effect on nearby residents	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial	ST: Insignificant LT: Beneficial
Removal of asbestos-containing materials, PCBs, and other hazardous materials—effect on workers	Insignificant	Insignificant	Insignificant	Insignificant
Increased solid waste generation and disposal	Insignificant	Not applicable	Insignificant	Insignificant
Removal of USTs—effects on workers	Insignificant	Not applicable	Insignificant	Insignificant
Removal of USTs—effects on soil and ground water	ST: Insignificant LT: Beneficial	Not applicable	ST: Insignificant LT: Beneficial	Insignificant
Explosive demolition of launcher and cutting of metal covered with lead-based paint	Insignificant	Not applicable	Insignificant	Not applicable
Draining of fuels, coolants, and lubricants—effects on workers	Insignificant	Insignificant	Insignificant	Insignificant
Generation, storage, and disposal of hazardous waste	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

Table 4.0-2 (Continued)

Summary of Potential Impacts for the Proposed Action Alternatives

Area of Potential Impact	SIGNIFICANCE			
	Proposed Action - Full Deactivation[1]	No Action	Partial Deactivation[1] (Two Squadrons Deactivated[2])	Missile Removal and System Shutdown
NOISE				
Aircraft noise	ST: Insignificant LT: Beneficial	Insignificant	Insignificant	ST: Insignificant LT: Beneficial
Explosive demolition noise	ST: Insignificant LT: Not applicable	Not applicable	ST: Insignificant LT: Not applicable	Not applicable
Traffic noise to and from deployment area	ST: Insignificant LT: Beneficial	Insignificant	Insignificant	Insignificant
TRANSPORTATION				
Traffic to and from deployment area	ST: Insignificant LT: Beneficial	Insignificant	ST: Insignificant LT: Beneficial	Insignificant
Accidents	ST: Insignificant LT: Beneficial	Insignificant	ST: Insignificant LT: Beneficial	Insignificant
Deployment area road upkeep and funding	ST: Insignificant LT: Adverse and locally insignificant	Insignificant	ST: Insignificant LT: Adverse & locally insignificant	Insignificant
SOCIOECONOMICS				
Employment opportunities from deactivation process	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	Not applicable	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant
Population change—impact on services	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	Not applicable	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant	ST: Beneficial and locally insignificant LT: Significantly adverse locally and regionally insignificant
School enrollment	Significantly adverse locally and regionally insignificant	Insignificant	Significantly adverse locally and regionally insignificant	Significantly adverse locally and regionally insignificant
Federal Impact Aid to schools	Insignificant	Insignificant	Insignificant	Insignificant
Housing	Significantly adverse locally and regionally insignificant	Insignificant	Significantly adverse locally and significant and regionally insignificant	Significantly adverse locally and regionally insignificant
Land use	Insignificant	Insignificant	Insignificant	Insignificant
Utilities—effects on rural electrification cooperatives	Insignificant	Insignificant	Insignificant	Insignificant

[1] Alternative would meet Strategic Arms Reduction Treaty requirements
[2] Predicted impacts are presented for deactivation of two missile squadrons

ST = Short-term (During the deactivation)
LT = Long-term

4.1 WHITEMAN AFB

4.1.1 Mission and Operations

If the proposed action were adopted, there would be a major change in the mission of Whiteman Air Force Base (AFB). The base would cease to be a missile support base (MSB); the 351st Missile Wing (MW) would deactivate and Detachment 9, 37th Air Rescue Squadron (Det 9, 37 ARS) would eventually be deactivated. New missions are scheduled to be activated at Whiteman AFB. The 509th Bomb Wing (BW) would become the host unit, with the basing of the B-2 Stealth bombers and T-38 training aircraft. In response to the *Defense Base Closure and Realignment Act of 1990* (Public Law 101-510), Richards-Gebaur AFB will close and the A/OA-10 aircraft, support units, and personnel of the 442nd Fighter Wing will realign to Whiteman AFB. This realignment action, along with the basing of the B-2 bombers and T-38 training aircraft, is being assessed in an EIS separate from this analysis. The cumulative impacts of the MM II deactivation at Whiteman AFB and the aforementioned reasonably foreseeable actions are discussed in chapter 5 of this analysis.

The 351st Communications Squadron, part of whose function is unique in the support of the MM II system, and other on-base organizations such as the Civil Engineering Squadron and Security Police Group, would be reassigned to the 509 BW and their functions modified accordingly to support the new mission of the base.

4.1.2 Installation Environmental Programs

The environmental management program at Whiteman AFB administered by the Environmental Engineering Flight (DEV) of the Civil Engineering Squadron (CES) would continue. However, the squadron would be reassigned to the new missions at the base.

4.1.2.1 Hazardous Materials/Hazardous Wastes, Special Wastes, Solid Wastes, Wastewater, and Air Emissions

The deactivation process would affect the management of hazardous materials/wastes at Whiteman AFB. There would be a short-term increase in the reuse and recycling of hazardous materials and the generation of special wastes and hazardous wastes from the deployed missile sites; section 4.7.2.2 discusses the significance of the increase. The significance of this impact depends on the quantities generated and the increased need for handling, storing, transporting, and disposing of hazardous materials and wastes. Beneficial impacts would occur over the long term from the decreased amount of hazardous materials used or hazardous wastes generated and/or disposed of by Whiteman AFB.

Deactivation impacts include increases in the generation and disposal of solid wastes; demolition debris would be disposed of in the launch tube of the LF where the activity would be occurring. Section 4.7.2.4 discusses the significance of the increased solid waste generated from the proposed MM II system deactivation.

Even though the support activities on base associated with the missile system would be deactivated, the buildings would still likely be reallocated to future missions; consequently, the volume of wastewater would only be slightly affected by this action. The expansion of the wastewater treatment plant (WWTP) is scheduled to be completed in the summer of 1992 and would more than double the capacity of the current system. Therefore, no significant impacts from wastewater generation, handling, and treatment would occur from the proposed MM II deactivation.

The proposed deactivation would influence air quality on base and in the deployment area. Potential changes in air quality on base would originate from greater mobile source (aircraft and vehicles) emissions in the short term (period of deactivation) and fewer mobile source emissions in the long term. In the deployment area, potential short-term increases in pollutant emissions would originate from construction activity, mobile sources, and demolition events. Air quality in the deployment area could improve in the long term because no mobile sources or activity associated with Air Force would occur. Section 4.2.2 is a detailed discussion of potential impacts to air quality that could result from implementing the proposed action or alternatives.

4.1.2.2 Installation Restoration Program

The remedial investigations and feasibility studies would continue concurrently and independently with the deactivation action, until cleanup is complete or closeout of the sites occurs. The deactivation action would not affect the identified Installation Restoration Program (IRP) sites, or vice versa. If any contamination was found remaining after the dismantlement and restoration of the LFs and LCFs, long-term remediation may be handled under Whiteman AFB's IRP; a decision on the office of primary responsibility and funding sources would be determined on an as-needed basis.

4.2 AIR RESOURCES

The air quality at the MSB and the deployment area would be affected by activities associated with the proposed action or alternatives. Impacts to air quality would result from the deactivation activities at the launch facilities (LFs) and launch control facilities (LCFs). The air quality would be affected along transportation routes and at intermittent periods at distinctly separate sites within the deployment area.

The significance of impacts to air quality is based on Federal, State, or local pollution regulations or standards. A significant impact would be a violation of the National Ambient Air Quality Standards (NAAQS), further exceedance of a nonattainment criterion, a violation of National Emissions Standards for Hazardous Air Pollutants or toxic chemical air pollutants, or exposure of sensitive receptors to increased pollutant concentrations above health-based levels. A beneficial impact to air quality would be a reduction in any baseline emissions.

4.2.1 Analysis Methods

The analysis was based on a review of existing data and publications on the potentially affected area. The review covered National Environmental Policy Act (NEPA) documents, base comprehensive plans, Environmental Protection Agency (EPA) regulations, Missouri State laws and regulations, emissions from explosives, emissions from equipment and vehicles used in deactivating LFs and LCFs, and a review of the current level of vehicular traffic at the sites and at the MSB. The review centered on whether Whiteman AFB is in attainment status with the NAAQS; the current force structure; the proximity of major sources of pollutants, such as metropolitan areas; and weather conditions. The distance from each LF and LCF to certain sensitive resources is provided in appendix F. Against this information background, the analysis investigated the potential for assumed air emissions to exceed standards. The methods used to assess air quality impacts are discussed in this section and the results of the analysis are presented in subsequent sections.

Air emissions from aircraft, vehicular traffic at the MSB and to and from the deployment area, and equipment used at the LFs were qualitatively evaluated. The primary emissions would be carbon monoxide (CO), nitrogen oxide(s) (NO_x), sulfur oxide(s) (SO_x), hydrocarbons, and suspended particulate matter. Qualitative rather than quantitative evaluations were conducted because the deployment area and MSB are in an attainment area. The temporary and short-term nature of the emissions attributable to the aforementioned activities does not warrant a detailed quantitative analysis when the air quality is anticipated to be insignificantly affected. A quantitative assessment of emissions from blasting and land disturbance was performed. The C-E-Q networks discussed in section 4.0 were used as the framework for the analysis of air quality impacts. Activities that could directly generate emissions were identified, as well as those effects on other resources that could indirectly affect the air quality.

The Prevention of Significant Deterioration (PSD) program (Clean Air Act (CAA) Part C (Sections 160 through 169)) requires an owner or operator to obtain a permit before constructing a major new source of pollution or modifying an existing major source located in an attainment or unclassified area. A major stationary source, as defined by the PSD regulations, is any source belonging to a list of 28 specified categories that has the potential to emit 100 tons per year (tpy) or more of any pollutant regulated under the CAA. Sources not on the list are considered "major" if they have potential emissions of 250 tpy or more of any pollutant regulated under the CAA. Site dismantlement activities in the deployment area as described in sections 2.2.3 and 2.2.4 are not included in the list of 28 categories and do not have the potential to emit 250 tpy of any pollutant regulated under the CAA; therefore, site dismantlement activities are not evaluated with respect to PSD regulations. Although Whiteman AFB is an existing major source of air contaminants, impacts on base are not evaluated with respect to PSD regulations because no increase in on-base emissions would occur compared to typical past levels (see section 4.2.2) as a result of the proposed action.

The Industrial Source Complex—Short Term (ISCST) model was used to estimate ambient concentrations of dust (total particulate), lead, and herbicide emissions caused by blasting and other soil-disturbing activities. ISCST is an EPA-approved guideline model designed to evaluate air quality impacts from a wide variety of sources associated with an industrial source complex. Although the ISCST was not designed to evaluate emissions of very short duration, the average emission concentrations were estimated for hourly or greater time intervals. For the example simulations, the model was run using calculated emission rates and 12 days of meteorological data (one per month) from 1989.

The actual amount of dust and other contaminants that may be contained in the dust that will be released into the atmosphere is not known, and will vary considerably, depending on site conditions. However, a realistic but conservative scenario was developed to investigate the potential for harmful effects from airborne contaminants. Immediately after blasting, the dust cloud was assumed to be 20 meters in horizontal diameter, with a height of 6 meters. The total amount of dust was assumed to be 100 pounds. Typical values for particle sizes, rates of settling for each particle size class, and reflection coefficients were assumed. These values were taken from an example model of wind-blown dust from an ore pile given by EPA in the ISCST documentation. Values for dust emissions from soil-disturbing activities, such as excavation, storing, and grading, were estimated based on typical construction activities.

Potential concentrations of lead-containing dust in air resulting from lead-based paints that have been used on the interior of the launch tubes were estimated by assumptions about the lead concentration in the paint, the number of layers of paint, the volume of the launch tube, and the amount of paint likely to be incorporated in the plume emissions. Based on data for typical industrial lead-based paints, a content of 20 percent lead was assumed to be used in the launcher (DuPont, 1990; Westinghouse Electric Corporation, 1990). The Department of Housing and Urban Development set a lead-based paint remediation level in public housing at 1 milligram per square centimeter

(mg/cm^2) of painted area or 0.5 percent by weight in the paint (55 FR 14577). The notice states that these levels are equivalent when the painted surface has about 20 layers of paint with a 0.5-percent-by-weight concentration. Using 20 percent lead-based paint, a value of 2 mg/cm^2 per layer of paint is calculated. Although past practices involved repainting only particular areas on an as-needed basis by removing the paint and applying new layers of primer and cover paint, it was conservatively assumed that five layers of lead-based paint exist in each launcher.

Concentrations of herbicides that may be carried aloft by dust were estimated by assuming that the herbicides were distributed in the dust at the maximum concentrations predicted for the top 10 centimeters of soil in the GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) model analysis, discussed in section 4.4. Pramitol® 25E was the only herbicide modeled because it was the only compound present at concentrations greater than 1 ppm after the second year of residue and leaching modeling.

A comparison of dust and lead concentrations to NAAQS follows in section 4.2.3. Additionally, a comparison of predicted concentrations to air quality health standards is provided in section 4.7 to determine potential impacts.

4.2.2 Potential Impacts of the Proposed Action on Base

The on-base air quality would not be significantly affected by the proposed action; in fact, there would be a long-term beneficial decrease in organic and particulate emissions.

The number of Missouri Air National Guard helicopter operations and associated pollutant emissions would not change with the proposed action. The flight-time for helicopters of Det 9, 37 ARS (three primary aircraft authorizations and two back-up inventory) would not change during the deactivation. Programmed flight-time is 1,440 hours per year. The detachment flew 376 missile site support missions in calendar year 1990 for a total of 609 flight hours out of 1,490. In calendar year 1991, the detachment flew 385 missions for a total of 746 flight hours out of 1,440. The remaining flight-hour time each year was used during non-missile support missions and training. Approximately 60 percent of the 1,440 hours is used for support operations and 40 percent for training. Approximately 40 percent of support operations consists of missile support (Curtis, 1992).

Helicopters would be used for convoys to escort the reentry vehicles (RVs) and missile guidance sets (MGSs) units from the deployment area to the MSB. Because all the RVs in a Missile Squadron (MS) would be removed before the boosters were removed, convoy activity (50 missions) for Det 9, 37 ARS would occur over approximately 1 month per year. During deactivation, maintenance convoys for the remaining squadron(s) could continue. Based on each convoy mission involving 2.5 hours of flight time, in 1990 approximately 110 convoy missions were flown. Only 40 convoy missions were flown in 1991. Thus, the number of convoy missions could nearly double during the first year of deactivation from the number of convoy missions that occurred in 1991.

During the second and third years of deactivation, the convoy missions would be less than double the 1991 convoy missions because fewer convoys would occur for failure replacement in the remaining squadron(s). In all instances, the number of convoy missions would be less than occurred in 1990. Other missile support missions such as crew swaps, parts runs, cable surveys, and miscellaneous support would be reduced during the deactivation process to compensate for an increase in convoy missions (Curtis, 1992).

Because the number of missile support missions would be only slightly more than those flown in 1991 and no change in Missouri National Guard helicopter operations is projected, the average annual pollutant emissions from helicopters on base would negligibly change and no significant impacts to air quality would occur. Front-loading all 50 convoy missions during approximately 1 month may cause an increase in pollutant emissions over emissions during the same time interval in previous years. Because of the limitation of helicopter flight-time, the magnitude of the increase would depend on the number of other support missions that would be forfeited during that same month. While this could cause a short-term increase in emissions from helicopters, the annual average emissions would not change. Det 9, 37 ARS helicopters would be realigned from Whiteman AFB after completion of all inactivations and conversions associated with the MM missile fleet. Thus, beneficial impacts to air quality would occur in the long term from the subsequent reduction in pollutant emissions generated by helicopter missions.

During a typical week of the deactivation, one C-141 or C-130 flight operation (arrival and departure of one aircraft) would occur to transport the boosters. Also, air operations in support of the deactivation could include an average of one C-141 operation per week to transport an RV (conservatively assuming only one RV is transported per aircraft) and one C-141 or C-130 operation per month for air transport of the MGSs. Assuming this flight activity is divided evenly over the period of deactivation, this level of C-141 and/or C-130 aircraft activity would be similar to that experienced in 1989. The C-141 or C-130 aircraft can fly in, be loaded, and fly out the same day. The total number of airplane operations during the deactivation would be more than occurred in 1990 when the runway was inoperable (closed for reconstruction to support the future B-2 mission) and similar to what occurred in 1989 and other past years with an average of less than 30 flight operations per week (Redelsperger, 1991). Approximately 7 percent of the total airplane operations would involve C-141s and C-130s; of those operations, less than 70 percent would be missile support operations. Total airplane emissions during the period of deactivation, 1993 through 1995, would account for approximately 6 percent of total base emissions, a negligible and insignificant change from past years. Over the long term, the air quality at the MSB, as it relates to aircraft emissions, would improve slightly because fewer aircraft operations would be needed to support missile operations and maintenance.

Deactivation activities would not appreciably increase MSB traffic volumes beyond traffic levels generated by a recent maintenance schedule (four to eight missiles brought in for servicing each month); a slight but insignificant increase would occur from current

levels. Over the long term, a reduction in base traffic and emissions would have a beneficial impact. Some tour trips to the future Oscar-1 museum (an LCF) and T-12 trainer (an LF) on base would generate an insignificant contribution of air emissions at the MSB. Vehicle emissions would be reduced by one-half (or approximately 191 tons per year from 383 tons per year), assuming that a personnel reduction of approximately 50 percent would result in a proportionate reduction in the number of government-owned vehicles (GOV) and privately-owned vehicles (POV) and consequently, mileage traveled on base.

No change in stationary source emissions on base is anticipated to result from the proposed action; thus, no modification to the base's existing air permits would be required and no additional impacts to air quality would occur from sources on base. Whiteman AFB is in an attainment area and has not violated its permits restricting air emissions. Consequently, the incremental on-base emissions that would occur from implementing the proposed action would conform with the requirements of the 1990 amendments to Section 176 of the CAA. Also, because no change is anticipated in emissions generated by Whiteman AFB, a major source as defined by PSD regulations (see section 3.2.2), no additional impacts on visibility and its subsequent influence on sensitive areas mentioned in section 3.2.2 would occur.

4.2.3 Potential Impacts of the Proposed Action in the Deployment Area

No significant impacts would occur to air quality from vehicle or construction equipment emissions, nor from the planned activities within the deployment area. However, a long-term slight improvement of air quality would occur.

Activity would increase to, at, and from the LFs and LCFs during site deactivation and dismantlement. Additional vehicular traffic, heavy equipment, construction activities, and explosives could increase the amount of air pollutants in the area. The main constituents of the exhaust from vehicles and heavy equipment include CO, NO_x, hydrocarbons, and suspended particulate matter. Pollutants from explosives (most likely ANFO [ammonium nitrate with fuel oil], TOVEX® [ammonium nitrate slurry with monomethylamine thickener], and TNT [trinitrotoluene]), include ammonia, CO, NO_x, and dust. Construction activities could also create additional fugitive dust. Although construction-related emissions are generally exempt from Federal, State, and local regulatory review, EPA still requires that such activities not exceed the NAAQS. Because of the small-scale, site-by-site nature of those activities that could produce air emissions and the mildly dispersive weather of the area (an average of 5 to 8 miles per hour wind speed and 56 to 78 percent humidity, as discussed in section 3.2), none of these activities would be expected to exceed air quality standards outside the immediate vicinity of the source, and any impacts to air quality would be insignificant. The deployment area is in attainment for criteria pollutants. Consequently, the incremental short-term emissions that would occur from implementing the proposed action would conform with the requirements of the 1990 amendments to Section 176 of the CAA. Over the long term, very few, if any, Air Force vehicles would be operating in the deployment area, and a beneficial impact to air quality would result.

4.2.3.1 Explosive Demolition Effects

Table 4.2.3.1-1 shows representative values of the predicted concentrations of dust, lead, and Pramitol® 25E (its active ingredient is prometon) at 250, 500, and 1,000 meters downwind from the demolition site. One hour after the demolition event, most of the dust has either settled or moved more than 5,000 meters downwind (the extent of the area modeled). To compare 1-hour modeled impacts to ambient air quality standards based on a 24-hour average, divide the 1-hour concentrations shown in the table by 24.

The NAAQS for particulate matter, based on particulate matter with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}), is a 24-hour average of 150 micrograms (µg)/cubic meter (m^3). Based on the particle size distribution used in the model, a PM_{10} concentration of 1.9 $\mu g/m^3$ is predicted at 250 meters from the blast site.

Table 4.2.3.1-1
Representative 1-Hour Average Pollutant Concentrations Resulting From Blasting

POLLUTANT	Micrograms per Cubic Meter		
	250 Meters From Site	500 Meters From Site	1,000 Meters From Site
Dust (total particulate)	441	121	29
Dust (PM_{10})	44.1	12.1	2.9
Prometon	3.7×10^{-3}	1.01×10^{-3}	2.4×10^{-4}
Lead	3.87	1.06	0.26

Because the NAAQS for lead is 1.5 $\mu g/m^3$ averaged over one-quarter of a year, the predicted lead concentration for one demolition incident (usually less than 1 hour in duration) would be more than two orders of magnitude below the NAAQS. Although there are no NAAQS or State standards for the herbicides, the predicted air concentrations of the herbicides are compared to health exposure standards and are discussed in section 4.7; occupational and other health standards for exposure to lead and particulates are also discussed. Pesticides and metals not modeled are predicted to be at lower air concentrations than those that were modeled; amounts of the other heavy metals remaining in the LF before demolition are projected to be less than the amount of lead, and the residues of the pesticides are less than those projected for prometon (the active ingredient in Pramitol® 25E). The projected impacts from inhaling these compounds are also discussed in section 4.7.

4.2.3.2 Land-Disturbing Effects

Vehicles the Air Force would use in the deactivation process include transporter-erectors, reentry vehicle and guidance control vans, flatbed trucks, cranes, security vehicles, maintenance vehicles, and other vans. Contractor personnel would likely use the following vehicles and equipment: dump trucks, concrete trucks, flatbed trucks, bulldozers, large backhoes, and cranes. The amount of traffic to, from, and within the deployment area is predicted to increase over the short term with the deactivation. Section 4.9 evaluates the change in traffic volume and patterns. Traffic would increase only slightly on U.S. and State highways, but could increase an average of 40 percent or more on county roads. Typical rates of dust emissions from land-disturbing activities such as grading and bulldozing are in the range of 27 to 168 kilograms per day (kg/day). Assuming an 8-hour work day, the emission rate for soil handling is only 1/12 to 1/2 of that assumed for blasting. Consequently, the impacts of the land-disturbing activities are also considered to be insignificant, although the emissions would likely occur over a longer time period (about 1 week per site).

4.2.4 Potential Impacts of Continued Operation (No Action)

No significant adverse impacts would occur to air quality under this alternative. Continued operation of the MM II missile system would result in continued emissions from vehicular traffic at the MSB and to and from the deployment area. Air emissions caused by transporting missile components from Whiteman AFB to other Department of Defense (DoD) facilities would continue to occur under the no action alternative.

4.2.5 Potential Impacts of Partial Deactivation

No significant impacts to air quality are anticipated under this alternative. This alternative is a hybrid of the full deactivation and continued operation alternatives. The same types of impacts would occur under partial deactivation of one or two squadrons of the MM II system as would occur under full deactivation. Because air emissions from the demolition of the LFs would occur intermittently in isolated areas under partial or full deactivation, the only difference in these alternatives is the larger, cumulative emissions under the proposed action (full deactivation). Continued operation of the remaining squadron(s) would also result in continuation of emissions from vehicular traffic at the MSB and to, from, and within the deployment area.

4.2.6 Potential Impacts of Missile Removal and System Shutdown

Both short- and long-term impacts to air quality would be insignificant. Over the short term, this alternative would cause fewer impacts on air quality than any other alternative considered except no action. Air emissions would originate from vehicles removing and transporting missile components and vehicles removing classified and save-list items. Equipment used to remove the underground storage tanks (USTs) and diesel electric units (DEUs), and equipment used to help fill and level portions of the sites would also cause air emissions. Other than particulate matter eroding from the

sites, no emissions from the former LF and LCF sites would occur in the deployment area over the long term.

4.2.7 Potential Impacts of the Implementation Alternatives

4.2.7.1 Non-Demolition of LF Headworks

The adverse impacts would be insignificant over the short-term, with the long-term benefit of no further operations in the deployment area. The impact on air quality would be decidedly less than that predicted for alternatives involving explosive demolition. No plume would be generated, site preparation and closure time would be decreased, and fewer vehicles would be needed to perform deactivation activities.

4.2.7.2 Mechanical Demolition of the LF Headworks

Because the deployment area has good air quality and is an attainment area, no significant impacts to air quality would be expected. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would occur over a longer period of time and would cause more emissions than those created by the explosive demolition event and the associated equipment.

4.2.7.3 HICS Removal

Because of the good air quality and attainment status of the deployment area, no significant impacts to air quality would be expected to occur. Removal of the hardened intersite cable system (HICS) would require the use of a backhoe, crane, dump truck, and flatbed truck. This equipment would cause air emissions in addition to those generated by the construction equipment at the LF and LCF sites. The disturbed soil would also be susceptible to wind erosion and result in further airborne particulates.

4.2.7.4 Delay of Deactivation for One Year

Potential impacts to air quality of delaying deactivation for 1 year would be the same as under the proposed action except for the delay.

4.2.7.5 Removal of Deep-Buried LCF USTs

No significant adverse impacts to air quality would occur as a result of excavating deep-buried LCF USTs. Under this implementation alternative pollutant emissions would be slightly more than if the LCF USTs were left in place. Equipment used to remove the underground storage tanks (USTs) and diesel electric units (DEUs), and equipment used to help fill and level portions of the sites would cause air emissions. Other than particulate matter eroding from the sites, no emissions from the former LF and LCF sites would occur in the deployment area over the long term.

4.2.8 Mitigation Measures

A number of mitigation measures apply only to explosive demolition activities, while others apply to any construction activity. Mitigation measures (specified in the contract for demolishing the sites) required by the Air Force could include:

- Periodically watering the ground, and restricting travel speed on unpaved roads to reduce fugitive dust.
- Ensuring that all construction equipment have fully operable emissions control devices to reduce emissions.
- Regulating the frequency of explosive activity within each area to reduce emissions.
- Limiting the activity to times when the weather favors rapid dissipation of pollutants.
- Restricting explosive demolition under atmospheric inversions and high wind speeds.
- Restricting explosive demolition when winds blow toward nearby dwellings or other sensitive areas.

4.2.9 Unavoidable Impacts

Air pollutant emissions as a result of explosive or mechanical demolition of the LFs would be an unavoidable impact. The combustive emissions from the construction equipment and personal vehicles, and the fugitive dust generated during dismantlement would also be unavoidable impacts. However, these impacts would be slight, of short duration, and could be mitigated, as discussed in section 4.2.8.

4.3 GEOLOGICAL RESOURCES

A geological resource is defined as a limited nonrenewable resource susceptible to degradation by physical disruptions. The impact of an action on geological resources is significant if it depletes the regional or local resource, activates a fault that causes damage, causes a slumping event (sudden downgradient movement of rock and/or soil) or earthquake that results in injuries or irreparable damage to land, escalates the pace of erosion, or degrades the soil characteristics and causes a loss of vegetation or lessens productivity. Negligible impacts will occur if the resource is only slightly affected or not specifically important to the region. Reduction of a hazard potential would be a beneficial impact.

4.3.1 Analysis Methods

The geological resources within the deployment area were studied to determine the potential impacts from the proposed action and alternatives. Fill for the excavations would likely be taken from borrow areas within the deployment area. Limestone is available from quarries within the deployment area and would most likely be used along with imported materials to cap launch tubes and elevator shafts. However, only small amounts of concrete would be used to cap the sites, which would not create a significant requirement for these materials from any one location. Therefore, the geologic resource requirements and impacts outside of the deployment area were not evaluated further.

Documents and maps containing information from previous studies on the geology, soil surveys, and geologic hazards were examined. The documents reviewed included Federal and State reports, geotechnical papers from the United States Geological Survey (USGS) and the State of Missouri, U.S. Department of Agriculture (USDA) Soil Conservation Survey maps, and USGS topographic maps (7½ minute series). The review focused on the regional geology, local and regional soils, and geologic hazards. Appendix F provides detailed information on the types of soil at each LF and LCF and the proximity of mines to each LF and LCF. The component activities and procedures of the system deactivation were then considered against this background of existing characteristics of the resource. The C-E-Q networks developed earlier and discussed in section 4.0 served as the analytic framework for investigating specific impact potentials.

4.3.2 Potential Impacts of the Proposed Action (Full Deactivation)

4.3.2.1 Physiography and Topography

The deactivation and dismantlement activities would insignificantly affect the area's physiography and topography. Minor soil erosion and minor slumping, as described in section 4.3.2.3, are possible impacts from implementing the proposed action. These impacts could be caused by explosive demolition of the launcher headworks.

4.3.2.2 Geology

Impacts of the proposed action to the geology near the affected sites would be insignificant. Impacts to water resources, which are partly influenced by impacts to the geology, could be significant and are described in section 4.4.

The shock waves from explosive demolition could produce additional fractures in weathered or fresh rock or disturb karst areas in the immediate vicinity of the launchers (0 to ½ mile distance). Each demolition would be designed to implode concrete and steel into the launch tube. The demolition would not cause ejection of surrounding rock into the air. Additional demolition-produced fractures in the fresh rock could alter the water table and normal ground- and surface-water flow by allowing more channels for flow transportation (see section 4.4.2.1). The explosive demolition event could also cause some existing fractures to close and could allow surface water to collect where it previously entered the ground.

Installation of the facilities during the early 1960s involved using explosives. Fractures, collapsed solution cavities, breccia zones, and a crevice with a small fault zone were reported in the initial investigation. Based on the estimated amount of explosives required for headworks dismantlement (approximately 500 pounds) and blasting restrictions on ground wave attenuation (described in section 4.8), it is unlikely that geological resources would be adversely affected by the explosive demolition of the launcher headworks.

The deployment area contains many large reclaimed surface coal mines and one barite mine. It also contains smaller reclaimed surface mines, possibly some unreclaimed surface mines, some mine shafts and prospect pits, and rock quarries. Some of these mines are within ¼ to ½ mile of an LF or LCF (see appendix F). Reclaimed surface mines are filled with rock and soil and seeded with grass and/or timber for surface stability. No impacts are anticipated on reclaimed surface mines. Unreclaimed surface mines within the deployment area would have been exposed to 20 years or more of weathering and erosion and could be susceptible to slumping and landslides from blasting at nearby LFs. Abandoned underground mines could be unstable and could be susceptible to collapse or subsidence triggered by blasting at nearby LFs. No significant impacts on mines are known to have occurred when explosives were used during construction of the facilities, so it is unlikely that they would be significantly affected by explosive demolition of the launcher headworks.

The principal oil field and natural gas production areas in the deployment area are located in Bates, Cass, and Vernon Counties. An analysis of the area around each MM II LF was made using USGS 7½-minute topographic maps and information from an oil and gas well location database provided by the Missouri Department of Natural Resources, Division of Geology and Land Survey. The Missouri Department of Natural Resources database identified a few oil wells within 1- or 2-miles of an LF or LCF (as mentioned in section 3.3.2). All wells within 2 miles of an LF or LCF are plugged or not producing because of the current oil market, so no active wells would be affected. No significant

impacts to the non-producing and plugged wells are anticipated because of the distance to the wells and the small amounts of explosives needed (approximately 500 pounds) to demolish the LF headworks.

Gas or oil pipelines are located throughout the deployment area and are, in some cases, within 1 mile of the blast locations. The contractor conducting blasting operations is required by State law (RSM Chapter 319) to notify nearby pipeline companies, and would be responsible for damage prevention. A notification hot-line managed by Missouri must also be contacted prior to conducting blasting activities near pipelines. Compliance with Corps of Engineers guidelines for preventing environmental damage from explosive demolition would also be required. No significant impacts are anticipated because of the small amounts of explosives to be used in these operations.

Municipal or privately owned water pipelines could also be subject to damage from the shock waves produced by blasting. The contractor would be required to abide with the same regulations and guidelines as for other pipelines. Therefore, no significant impacts to water lines are anticipated.

Although unlikely, spills of hazardous materials or wastes could occur and contaminate surface or ground water during deactivation (see section 4.4.2). Consequently, mineral resources could be contaminated. As discussed in section 4.7.2.2, spills would be contained according to the Spill Prevention and Response Plan and requirements specified in the dismantlement contract. Hazardous materials and wastes removed from the sites would be properly packaged to minimize the chance of a spill. The materials would be moved during many separate trips for the separate facilities; thus the amount of material being moved or handled in any given day would be limited. Because of the limited quantities of hazardous materials and wastes being handled or transported at a given time and location, the remoteness of mineral resources from the sites, and the requirements to remediate spills, no significant impacts caused by spills are projected to occur. No additional mitigation measures are required because the existing transportation and handling requirements, as well as the prescribed spill response activities, are sufficient to minimize the potential for mineral resource contamination.

4.3.2.3 Soils

Although many soils in the deployment area are very susceptible to erosion, a total area less than ½-square mile would be affected throughout the deployment area, and the Air Force and its contractors would use a number of techniques to suppress soil erosion on site. Consequently, soils are expected to be insignificantly affected by the deactivation activities.

Soils in the deployment area are moderately to highly prone to water erosion, as described in section 3.3. Wind erosion is a problem in scattered areas. LF and LCF dismantlement could lead to increased soil erosion, which in turn could lower soil productivity and adversely affect crops, grazing lands, and streams. Also, if the soil eroded from an area of herbicide treatment, this herbicide-laden soil could potentially

contaminate crop or grazing lands or adjacent water bodies. These impacts could arise from the exposure and destabilization of soil during excavations at LFs and LCFs. After the USTs, piping, and support equipment have been excavated and the headworks demolished, a large amount of soil fill will be needed—a volume of roughly 450 cubic yards (yd^3) at each LF and approximately 300 yd^3 at each LCF, or roughly 70,000 yd^3 for the entire missile wing. The volume of required fill could exceed this estimate if soil at the LFs or LCFs were contaminated by spills or leaks and had to be removed for proper treatment and/or secured disposal. Excavations of offsite soil to provide fill would also expose soil to wind and water erosion at the borrow areas, potentially increasing sedimentation of streams in the region. However, the Air Force plans to use established borrow pits; no additional areas would be exposed to potential erosion.

In most cases, LFs (particularly the launch tube door) are constructed on sites higher than the surrounding land. Shoring walls are constructed around the tube during the deactivation process. Contractors will be advised to maintain adequate drainage around the opening to prevent runoff from entering the launch tube (CETSO/ESM, 1992).

As discussed in section 3.3.3, 10 LFs and 1 LCF are in or near Special Area Land Treatment (SALT) project areas. These areas were defined to offer special assistance to farmers and other interest groups; SALT does not place requirements on operations. When deactivating these sites, the Air Force and its contractors would use the best management practices to limit potential soil erosion. Potential mitigation measures are listed in section 4.3.7.

The high shrink-swell potential and low load-bearing strength of many soils (particularly the subsoil) in the area (see table 3.3.3-1) could also limit their usefulness as fill dirt; use of such soils with their excessive clay content for fill could cause subsidence and uneven compaction of the reclamation site.

The contractor would be required to reestablish drainage at the site. If the drainage was not reestablished, water could collect in depressions above the former launchers, exacerbating the potential for herbicides or hazardous materials to leach from the soil. Section 4.4 describes potential impacts on water resources.

The potential for minor slumping of certain water-logged soils exists in parts of the deployment area in Bates, Cass, Vernon, Lafayette, and Saline Counties. The contractor may need to take precautions to avoid potential slumps, especially after heavy rains or if the soil is saturated. Allowing the soil to dry sufficiently before allowing work to be conducted in it or using standard construction procedures, such as shoring, will minimize slumping problems.

During excavation and regrading of the LF areas, soils treated with pesticides would be disturbed and soil layers would be reworked. Section 4.4 discusses the potential for leaching and surface runoff of pesticides and section 4.7 discusses air levels and potential health hazards of pesticides. Because all soil at each LF has already been treated and

has been subject to air and water erosion, disturbing it is unlikely to cause any new impacts.

A permit would not be required for the use of fill at the LFs and LCFs. However, before it could be used, a crusher brought onsite to reduce rock to acceptable fill size would require an application for an exemption from the Air Pollution Control Division of the Department of Natural Resources (MDNR, 1991).

As discussed in section 2.2.4, the deep-buried LCF USTs would be left in place. This would reduce the amount of soil erosion at the LCF sites that would occur from removing the USTs. To meet Missouri closure requirements, each UST must be adequately filled to help immobilize any existing residues and prevent the UST from moving towards the surface. If the soil was contaminated, clean fill would brought in to replace the contaminated soil. The amount of fill needed would be somewhat more than the amount required if these USTs would be excavated.

Under the proposed action, the hardened intersite cable system (HICS) would be abandoned in place and the gates and marker posts would be removed at the landowner's discretion. Removal of marker posts could potential cause some erosion of soil as the ground cover is disturbed, but the area of erosion would be limited to the proximity of the post and the time that the ground would be disturbed would be very brief. The easements for placing and maintaining the cable specify that the cable shall be maintained at a minimum depth of 36 inches. Issues of potential concern include: erosion or a change in land use reducing the depth at which the cable is buried. The reduction in burial depth on land presents a potential hazard to farmers operating disc equipment with tractors.

4.3.2.4 Geologic Hazards

Significant adverse impacts related to the low probability of triggering a fault or an earthquake are not expected to occur.

Although several earthquake epicenters are located within the deployment area, activation of faults in the deployment area from explosive demolition of the LF headworks is unlikely. The equivalence of earthquakes and amounts of TNT detonated have been well documented. Detonating 500 pounds of TNT would cause a shock wave equivalent to an earthquake of approximately 3.0 magnitude on the Richter Scale (Birkeland and Larson, 1978). The resulting shock wave could be felt by some people in the immediate vicinity of the LF, but would not be perceptible to most people in the area. Earthquakes caused by human activities are not unusual and have also occurred from stress loading of the earth's crust by the construction of large reservoirs; disposal of liquid wastes into deep wells, which raises the fluid pressure in a rock and simplifies movement along fractures; and underground detonation of nuclear devices (Keller, 1979).

If the required specifications for the ground attenuation limits were exceeded, the explosive demolition of the launcher headworks could damage nearby structures by ground vibration. The U.S. Army Corps of Engineers blasting specifications, which

would be followed for use of explosives in the proposed action, state that blast-produced ground vibrations cannot exceed a ground particle velocity of 0.75 inch per second at frequencies less than 40 Hz or 2.0 inches per second at frequencies of 40 Hz or greater (COE, 1986). These specifications were designed to prevent damage to nearby structures.

The underground explosions would be similar to mild, barely noticeable earthquakes in some respects, although technically the physics of the events are quite different. The most damaging components of an earthquake are "shear" waves of ground motion, which are absent in an explosion. The waves of compression and dilation (P waves) produced by an explosion can, however, cause structural damage, especially when the P waves propagate through rock or soil at low frequency. The shale and sandstone common in the deployment area do propagate P waves at low frequency. However, many other factors also determine the potential for structural damage, including the soil temperature and moisture content and, of course, the type and proximity of the structure. One major factor affecting damage potential is one over which the Air Force has some control: the precise timing of detonation of the several explosive charges used in demolishing each headworks. Detonation of the explosive charges in microsecond intervals reduces the amplitude of ground vibrations (Kopp and Siskind, 1986).

Another effect of blasting is the air blast produced by the explosive detonation. The potential impacts of the sound waves from explosive demolition of the LF are discussed in section 4.8.

4.3.3 Potential Impacts of Continued Operation (No Action)

The current impacts on geologic resources are insignificant. Continued operation of the MM II missile system would not produce any new impacts to the geology or soil within the deployment area or create new geologic hazards. The same amount of erosion would occur; and continued herbicide treatment of the graveled areas would combine to cause the transport of herbicide-laden soil to adjacent bodies of water, crops, and rangeland.

4.3.4 Potential Impacts of Partial Deactivation

Partial deactivation of the MM II system through deactivation of one or two missile squadrons would cause the same type and significance of impacts to the geology, soils, and geologic hazards as the proposed action. The areas disturbed by this action would be affected to the same extent as full deactivation, but less overall area would be disturbed. Although the amount of fill required per LF and LCF would be equivalent to that for the proposed action, fewer fill operations would be required and less fill would be needed under the partial deactivation alternative.

4.3.5 Potential Impacts of Missile Removal and System Shutdown

The short-term impacts to geologic resources from activities performed under this alternative would be insignificant and similar to those described for the proposed action, with the main exceptions being the smaller amounts of fill needed and the lack of explosive demolition.

The amount of fill would range from approximately 15 yd^3 to approximately 90 yd^3 per LF, depending on whether the launch facility support building (LFSB) is destroyed, and 60 yd^3 per LCF, for a total of approximately 3,000 yd^3 to 14,000 yd^3 for the entire missile wing. This amount of fill is much less than that required for the proposed action. Because the fill is scheduled for removal from existing borrow pits, it is unlikely that soils would be significantly affected. The long-term impacts of this alternative would be insignificant and slightly less than the effects predicted under no action.

4.3.6 Potential Impacts of the Implementation Alternatives

4.3.6.1 Non-Demolition of LF Headworks

No significant impacts to geologic resources are projected for implementation of this alternative. The non-demolition alternative differs from the proposed action because the LF headworks would not be demolished; the adverse impacts associated with explosive demolition would not occur under this alternative, and less fill would be required. The fill volumes needed would be similar to those under the missile removal and system shutdown alternative.

4.3.6.2 Mechanical Demolition of the LF Headworks

It is unlikely that geological resources would be adversely affected by the mechanical demolition of the launcher headworks; no significant impacts are anticipated. The extended period of ground vibration from mechanical demolition is also unlikely to affect nearby oil wells. Other mining operations, such as limestone quarries, are unlikely to be affected by mechanical demolition. Many of the mining operations routinely use explosives that produce greater vibrations than a persistent mechanical demolition.

4.3.6.3 HICS Removal

It is likely that HICS removal would cause a significant adverse effect on soil resources of the area because of the amount of erosion that may occur. Excavation of the HICS would disturb the soils and topography and require the use of fill material to replace the void where the cable used to lie.

4.3.6.4 Delay of Deactivation for One Year

The impacts to geological resources under this implementation alternative would be the same as under the proposed action except the impacts would be delayed by 1 year.

4.3.6.5 Removal of Deep-Buried LCF USTs

Insignificant adverse impacts to geological resources are anticipated to occur under this implementation alternative. Excavating the deep-buried LCF USTs would increase the amount of soil erosion at the LCF sites. However, the excavation would occur during a relatively short period of time. Consequently, soil erosion would likely be limited to the vicinity of the soil stockpiled adjacent to the excavation. Because the launch tube is higher than the surrounding land and shoring walls would be in place for the excavation, any runoff or soil erosion would flow away from the excavation. In the unlikely event that a heavy rainfall would occur during the excavation, soil erosion could occur at a somewhat higher rate. Based on the need for a 1:1 slope, the excavation would cover a large area and require a substantial volume of fill to be replaced from the adjacent stockpile.

4.3.7 Mitigation Measures

Potential adverse impacts can be avoided or minimized by carefully implementing the following measures (the Air Force can require or recommend that the contractor performing the site deactivation follow these mitigation measures):

- Conduct detailed site surveys around the LFs to identify and avoid karst areas (solution cavities), fracturing, and fracture-prone areas of the bedrock and surface outcrops. After identifying these areas, adjust the demolition plan to lessen impacts on the surrounding rock structure by adjusting the timing and quantity of the explosives.

- Use erosion control devices and sediment traps to contain sediment that might erode LF and LCF sites.

- Reestablish drainage at the sites to avoid creating depressions that could collect vater.

- Mitigate wind erosion at the worksite by lightly watering disturbed soil.

- Use standard construction procedures, such as shoring, to minimize slumping in vulnerable soil groups.

- Survey homes near the sites before explosive demolition to identify particularly sensitive structures and adjust the demolition plan to minimize adverse impacts.

4.3.8 Unavoidable Impacts

The ground disturbance during deactivation would have a short-term unavoidable impact on the soil resources of the deployment area. Mitigation measures will minimize, but not eliminate, the irretrievable loss of soil committed to fill and soil lost by wind and water erosion.

The fill for the launch tube, the steel rebar, and the concrete for caps at the LFs and LCFs constitute an irretrievable commitment of resources, including limestone, other concrete components, and components for making steel.

4.4 WATER RESOURCES

Water is a naturally renewable, yet finite, resource. Physical disturbances and the introduction of chemicals can degrade the quality and quantity of water. Therefore, the destruction of MM II missile launchers might have an adverse impact on the water resources. An impact would be considered potentially significant if an aquifer or surface water body is damaged, resulting in a measurable change in a user's water supply, or if the water quality is affected so that it exceeds Federal or State maximum contaminant levels (MCLs). A measurable reduction in yield (discounting seasonal variations) from water wells through direct impacts to wells would also be a significant impact. An impact would be negligible if the change in the water quality or quantity were immeasurable. Increased recharge or improved water quality would be beneficial impacts.

4.4.1 Analysis Methods

The analysis methods used centered on concerns related to the removal of MM II missiles and the elimination and destruction of the missile launchers. Other activities that could involve potential siltation of streams or movement of contaminants to ground or surface water were also assessed. Pesticide use at the LFs was evaluated to assess the potential for water contamination. The C-E-Q networks developed for this analysis assisted in the data gathering efforts and focused the study at potential impacts to water resources. An early process in the analysis was to define the extent of the deployment area and examine its water resources. Documents from previous studies of ground water, surface water, and water quality were examined to support the analysis of the elimination/destruction action. These documents included Federal and State reports, geotechnical papers from the USGS and the State of Missouri, and USGS topographic maps (7½ minute series). The review centered on the proximity of launchers to stock ponds or impoundments, perennial streams, and other bodies of water, in addition to the regional hydrogeology and water quality. Appendix F provides detailed information on the proximity of water wells, ponds, impoundments, and streams to LFs and LCFs.

Computer models, CREAMS (Chemicals, Runoff, and Erosion from Agricultural Management Systems) and GLEAMS (Groundwater Loading Effects of Agricultural Management Systems), were used to assess the likelihood of pesticide residue accumulating, leaching, and running off. Appendix A describes the models, provides the assumptions used in modeling the environmental fate of the pesticides, and presents some graphs of herbicide residues over time. Results from the modeling are summarized in section 4.4.2.1.

As previously discussed in section 3.7, there are some heavy metals of concern at the LFs and LCFs that could be released into the environment during and subsequent to the deactivation and dismantlement process. The interiors of each launcher, launch control center (LCC), and launch control equipment building (LCEB) have been painted with industrial paint that may contain 15 to 20 percent lead by weight. Other heavy metals,

such as chromium and mercury, may also be in the paint. In addition, small areas of the LF and support buildings were electroplated with cadmium.

Ground water has seeped into some LFs on occasion and has been removed with sump pumps, water drains, and mop-up operations (351 SPTG/DEL, 1991). Because ground water seeped into the LFs in the past and the proposed action and other alternatives that would involve disabling the cathodic protection well could enhance the possibility of ground water seepage through corrosion of the concrete and steel, it is possible that the ground water could come in contact with the lead-based paint, leach the heavy metals, and migrate to private or public water supplies. The LCC and LCEB would not undergo demolition. Consequently, the environmental fate and transport of lead in the launch tubes was modeled. Appendix B provides details of the modeling evaluation, and the results are summarized in section 4.4.2.1.

4.4.2 Potential Impacts of the Proposed Action (Full Deactivation)

Demolition activities could have significant adverse affects on the ground water yields of shallow wells within ¼ mile of an LF in the western part of the deployment area; however, ground water in the deep aquifers in the eastern part would not be significantly affected by an explosive demolition. Leaching of lead from paint would not add significantly to background levels at any wells that occur down-gradient and impacts to ground water from the past use of pesticides would be negligible and insignificant. There is a potential for short-term adverse, but not significant, impacts to surface water quality during the site deactivation and until vegetation is reestablished; the long-term impacts would be negligible and insignificant. Ponds with underlying low permeability sediments or rock less than ¼ mile from an LF could be fractured by explosive demolition. If seepage occurs, the ponds would be significantly affected.

4.4.2.1 Ground Water

The local ground-water quantity and quality could be affected if aquifers were damaged by deactivation and destruction activities. Excavating fill and removing pieces of the LF should minimally affect aquifer recharge or quality because most of the aquifers are primarily recharged through precipitation and/or leakage from overlying formations and/or the Ozark Plateau. Deep aquifers are also unlikely to be disrupted by explosive demolition of the headworks. However, shallow, unconfined aquifers of alluvium or weathered, fractured, and brecciated carbonate (limestone or dolomite), shale, or sandstone could be adversely affected by headworks demolition or fill excavation. A large proportion of the LCFs and LFs are located in areas of perched water tables. Most of the facilities are located in the Osage Plain which has a perched water table in unconsolidated sediments or Pennsylvanian strata. About one-half of the facilities located in the Salem Plateau have perched water tables in the overburden.

The potential adverse effects to shallow aquifers include changes in water quantity and quality resulting from one or more possible mechanisms. The shock from the explosions

could disrupt the top aquifer, disrupt the low permeability material below the aquifer, or disrupt the perched water table. The demolition events are designed to cause implosion of the steel and concrete from the headworks into the launch tube. The minimum amounts of explosives would be used and limitations on ground wave movements would be enforced to decrease the likelihood of significant impacts to wells and aquifers. Disruption of the lower unit or the perched water table could allow water in the aquifer to drain or percolate at higher velocities through underlying units and thereby lower the water table. This same mechanism could also connect aquifers of different yields and water qualities, leading to changes in supply and water quality for nearby users of either aquifer. Shock waves from an explosion could also cause a local change in the aquifer's hydraulic gradient over time by inducing ground water discharge. The direction and amount of flow could change and possibly affect water quantities and quality for local users.

There are two main guidelines for blasting: a maximum peak velocity of 2.0 inches per second, and a set scale of distance of 70 (scale of distance equals the distance of concern divided by the square root of the maximum pounds of explosive per delay). The scale of distance is used in coal mining regulations and is considered by Missouri DNR Division of Geology and Land Survey when evaluating blasting by mining industries in Missouri.

Considerations that must be addressed before blasting include: (1) the distance to a rock outcrop; (2) the distance to residences; (3) the geology; (4) the size of drill used; (5) the depth of holes drilled; and (6) the maximum amount of explosive per delay. The charge size can typically vary from 50 pounds to more than 1,000 pounds. In general, blasting in a quarry requires from ¾ pound to 1¼ pound of explosives per cubic yard of rock. Fragmentation of rock for construction projects typically requires 1½ pounds of charge per cubic yard. About 2 pounds of charge per cubic yard is required to fracture reinforced concrete (Bayer, 1992).

Studies done on the blasting effects on shallow, low-yield wells drawing from fractured rock in Appalachia indicate that a level of 2.0 inches per second peak velocity, the maximum allowable under the proposed blasting specifications (about 80 to 85 percent of maximum resultant particle velocity) for that program as well as for the proposed action, was not high enough to damage the wells. Results of the blasting did include lateral stress relief, which increased the fracture width and the storage space in the aquifer, which, in turn, lowered the static water levels in local wells (U.S. Bureau of Mines, 1980).

Severe blast-induced influences on aquifers are rare. The blasting done by highway crews has had a few instances of severe impacts on water wells within Missouri (Miller, 1992). Most of the domestic wells in the deployment area are shallow and are located in carbonate aquifers that often have a permeability so marginal that a severe disturbance could alter the flow paths and crevices. The vibrations from blasting disturb the fine materials in a formation. The fine materials move into fractures and crevices, decreasing or precluding water flow to nearby wells. It is possible that domestic wells

within a few hundred yards of a blast site could be affected by a demolition explosion. It is rare for problems to occur at a distance greater than ¼ mile (Miller, 1992).

In one instance, highway construction (including excavation) and explosive demolition within an aquifer south of Kansas City occurred before a decrease or loss of yield in 32 wells up to ½ mile from the construction site (Jones, 1992). The case is under litigation. The impacts allegedly attributed to the blasting and excavation events included increased siltation in the aquifer, production of oil from the formation (and its consequent seepage to the surface and into wells), and decreases in flow paths through the aquifer. The aquifer affected is a friable, channel-fill sandstone of Pennsylvanian age. These types of sandstones are more susceptible to disruption from blasting events because they are not well cemented and are subject to loss of integrity. Some wells in the aquifer had a static water level of about 4 feet.

Eleven LFs (K-3, K-4, L-11, M-3, M-5, M-8, N-2, N-3, N-8, O-5, and O-7) intersect Pennsylvanian channel-fill sandstone; one LF (M-7) is anchored into the Pennsylvanian Pleasanton Group and may contain a channel-fill sandstone; four LFs intersect Pennsylvanian sandstone of unknown origin (E-10, F-5, G-5, and G-7), and one LF (E-8) intersects Pennsylvanian sink fill in an ancient karst terrain. These LFs are located in the western part of the deployment area (where it is known that the shallow Pennsylvanian aquifers are used for a source of potable water), and some are within ¼ mile of a house. It is possible that explosive demolition of the headworks of the aforementioned LFs could adversely affect the ground-water yields of shallow wells in Pennsylvanian strata within ¼ mile of an LF; based on the significance criteria, this impact would be considered significant.

Although some shallow fracturing of formations denser than the channel-fill sandstone could occur from explosive demolition of the launcher headworks, it is unlikely that waters from different aquifers would mix to any extent greater than they normally do. The low gradient and low permeability of the formations in the area would tend to inhibit mixing of the water from the shallow unconfined aquifer with water from the confined aquifers.

The low amounts and degrees of karstification within the deployment area limit the potential for mixing of ground waters in carbonate terrain.

Many of the possible effects on aquifers from the deactivation activities could be beneficial—increasing rather than decreasing yields, for example. However, it cannot be assumed that all such impacts would be beneficial.

Ground water in the deep aquifers (Pennsylvanian (in the eastern part of the deployment area), Mississippian, and Cambrian-Ordovician) would not be significantly affected by an explosive demolition event or potential leaching of metals from the LFs and LCFs. The depth of the aquifers and the confining units between the aquifers would isolate them from the effects of demolition. It is unlikely that adverse effects to ground-water quality would occur in the deep aquifers for the reasons listed below:

- Both the vertical and horizontal hydraulic conductivity of the Pennsylvanian strata is extremely low (excluding channel-fill sandstone). The shale layers throughout the Pennsylvanian aquifer greatly inhibit vertical movement, as does the confining layer at the base of the Mississippian aquifer.

- The ground water in the deep aquifers beneath the deployment area is artesian but will not produce flowing wells. Artesian pressure will force water to rise nearly to the land surface northwest of the fresh-water/mineralized-water contact zone. The higher hydraulic pressure in the deep aquifers and the lower hydraulic conductivity near the surface will reduce or prevent the vertical movement of water into the deeper aquifers.

Several Air Force facilities southeast of the fresh-water/mineralized-water contact zone in the deployment area are in or near recharge areas of deep aquifers. As discussed in section 3.4, lateral recharge is the main recharge source for the deep aquifers. LCFs D-1, E-1, and LFs D-5 to D-11, E-2 to E-4, F-3, and F-4 are located in Ordovician strata. Based on core logs, the Ordovician strata is encountered at depths of 50 feet or less at most of these facilities. It is possible that explosive demolition of the LFs in this area could increase the recharge of the formation by fracturing the formation near the LF. However, low permeability layers within the aquifers limit the downward movement of water into the deeper aquifers.

Excavation of fill for use at LFs and LCFs could affect aquifer recharge or discharge. However, the amount of fill required, if taken from several areas, would negligibly affect discharge or recharge rates. Excavation of fill will occur at commercial borrow pits and would be designed to avoid intercepting the water table, because ponding would threaten the economic viability of the borrow area.

After salvage operations and demolition of the launcher headworks, the residual lead-based paint inside the launcher, LCEB, and LCC could leach into the ground water. Ground water could enter the launcher, LCEB, or LCC and leach lead and other heavy metals from the paint. Because the cathodic protection system would be dismantled, any LFs in an area that has an unconfined aquifer with a depth of less than approximately 60 to 90 feet would have eventual seepage of ground water into the launch tube.

The rate at which lead leaches and migrates to adjacent, shallow private or public wells used for potable water is calculated in appendix B. The assumptions used in the quantification of contamination were based on the study of aquifer characteristics (water quantity and quality parameters) and the location of the sites (proximity and topographic relationship of wells to LFs). Also evaluated were the concentration and volume of lead-based paint in the launch tube, and the rate of lead leaching from the paint by ground water.

The model results of simulated ground-water transport over a 20-year period showed that lead concentrations from paint were not expected to exceed a fraction of one part per billion in any of the modeled cells adjacent to the LFs. Leaching of lead from paint would not add significantly to background levels at any wells that occur down-gradient.

As discussed in section 3.4, ground-water quality data on public distribution systems within the deployment area indicated that the heavy metals of concern (known to be at the LFs and LCFs) were below the maximum contaminant levels (MCLs), except for two lead analyses. These water samples had lead concentrations above or at the MCL (18.0 µg/L and 15.0 µg/L). Although the groundwater from wells at the LCFs (B-1, C-1, D-1, E-1, F-1, and H-1) has not been tested for heavy metals, it is unlikely that the quantity or quality of this water would be affected by the deactivation. The average depth of the LCC and LCEB at each LCF is approximately 40 feet. The water wells intersect low permeability strata and range in depth from 860.3 feet to 949.8 feet. Consequently, it is unlikely that the leachate waters would mix with the deep waters. Clays within the low permeability rocks have a high adsorption coefficient. As water would migrate through the rock, the lead would likely be adsorbed to the clay-rich rock.

If lead levels in ground water from wells in the deployment area were only slightly less than the MCL (15.0 µg/L), it is possible that the infinitesimal increase in lead levels would cause an exceedance of the MCL, and result in a significant impact to the ground-water quality. Based on well sampling data (see section 3.4.1.2) and ground water modeling data (see appendix B), the water quality of the shallow aquifers would be insignificantly affected by the migration of lead in ground water. Because earlier sampling data revealed a trend of potentially high lead values at sites in which later testing indicated low lead levels (relative to the MCL), it is likely that other samples are anomalously high. This further supports a determination that the ground-water quality would not be significantly adversely affected by the proposed action.

As previously stated, cadmium electroplating and other heavy metal additives in the paint (chromium and mercury) might also undergo leaching. Based on the amounts of heavy metals with respect to lead, it is anticipated that the concentrations of leachate would be appreciably lower than that calculated for lead. With MCLs of 2 µg/L for mercury, 10 µg/L for cadmium, and 50 µg/L for chromium, the leachate is anticipated to be at least an order of magnitude lower than the MCL for these heavy metals.

It is likely that the LFs and LCFs, once deactivated, will not be Resource Conservation and Recovery Act (RCRA) sites regulated under Subtitle C (see section 4.7). Because the predicted concentrations of heavy metals are significantly below health-based levels, no long-term ground-water monitoring of the sites is necessary. However, if they were regulated as hazardous waste sites, monitoring wells would have to be installed at each site.

A computer model was used to estimate the possibility of residues of pesticides, specifically herbicides, remaining in the soil from long-term use (see appendix A). The proportion of these pesticides that migrate by runoff and leaching was also determined

from GLEAMS modeling runs. Results from the model runs show that the pesticide residues are nearly totally degraded within 1 year of application, except residues of Primatol® 25E. Residues of Primatol® 25E in the top 10 cm of soil were calculated as high as 8 ppm in the second year of application and decreased to 6 ppm by the fifth year. The concentration of Primatol® 25E leaching beyond 91 cm (36 inches, the lowest depth simulated) was modeled to be less than 0.0045 parts per million (ppm) during the 5-year period of analysis.

The prometon residues from Primatol® 25E are not likely to have reached even the shallow aquifers around some of the LFs and LCFs. Thus, potential impacts to ground water in the deployment area during and after the deactivation period from past use of pesticides would be negligible and insignificant. Beneficial results to the future land owner from discontinuation of pesticide application could be realized if vegetative growth were considered desirable to the new landowner. In addition, the environment would receive long-term benefits through the discontinuation of pesticide applications.

As discussed in section 2.2.4, the liquid and solid contents of the lagoons at each LCF (except O-1 which is connected to the base waste system and lacks a lagoon) would be tested before deactivation. Based upon the test results, the contractor may be permitted to discharge the effluent directly into the surface waters or to use other proper disposal methods. The dismantlement plans and specifications require the contractor to drain the lagoons, level and grade the berms for proper area drainage, and to stabilize (mulch) and seed the area with native grasses. The soil preparation and seeding activities will be based on the Soil Conservation Service technical specifications for Missouri. Closure of the lagoon would have a slightly beneficial effect on the surrounding environment, including the ground-water quality.

4.4.2.2 Surface Water

The surface water hydrology within the deployment area could be altered by the destruction and removal activities. Although highly unlikely, some streams may be diverted by headworks demolition. Explosive demolition of the launchers would cause dust to settle in nearby surface water bodies and would increase the erosion potential of the soils at the LFs. Airborne dust and runoff would temporarily increase turbidity. Because Missouri has abundant rainfall with heavy runoff, there is a potential for short-term adverse, but not significant, impacts to surface-water quality during the removal process and until vegetation is reestablished; the long-term impacts would be negligible and insignificant.

The potential for runoff of pesticides that have been applied at the LFs and LCFs is evaluated in appendix A. The potential for runoff exists only if heavy rains occur soon after application. Runoff of the pesticides would be greater from any sites that have more erodible soils or greater slopes than assumed for the example scenario, but the overall conclusion would not change over the expected range of conditions. Runoff of residual pesticides would not significantly degrade the quality of surface water and is not considered to be a significant hazard.

The deployment area has many small impoundments for irrigation and stock watering, as well as some water supply reservoirs. There are at least 200 water reservoirs within ¼ mile of an LF and another 200 reservoirs within ¼ to ½ mile of an LF. Appendix F provides information on the distance of streams and other water bodies to LFs and LCFs. These stock ponds and small impoundments have an earthen dam downgradient of their water reservoirs. Although unlikely, demolition of the launcher headworks could cause some dams to leak. The specifications for blasting are designed to keep ground attenuation below damaging levels. In the extremely unlikely event of a dam rupture, the water supply would be adversely affected in the short term, and catastrophic effects could occur downgrade of the dam. Some small ponds are formed by rain water collecting in basins with underlying low permeability sediments or rock. It is possible that ponds less than ¼ mile from the LF could have the low permeability material fractured by explosive demolition. Seepage of water from these ponds could occur, causing a significantly adverse impact.

If diesel fuel or hazardous materials, such as sodium chromate solution or polychlorinated biphenyls (PCBs), are spilled and not promptly contained, runoff to adjacent water bodies could have a significant adverse effect on surface water quality. Because of the normal caution in handling these materials and the required capability of the Air Force or an Air Force contractor to perform spill response actions, it is highly unlikely that significant concentrations of spilled liquid could reach and contaminate surface waters. Except for the possibility of contamination from spills, the surface waters are not expected to experience any long-term effects from the proposed action.

The hardened intersite cable system (HICS) occasionally crosses under streams within the deployment area. The HICS is buried from 3 to 6 feet below ground, but it is closer to the surface near the line-of-sight markers. The easements for placing and maintaining the cable specify that the cable shall be maintained at a minimum depth of 36 inches. Issues of potential concern include: in places where the cable crosses rivers or streams, scouring of the bed could expose the cable and allow it to float on the water. Cable floating on waterways presents a potential hazard to navigation. However, there have been no cases of injury to persons or damage to boats in the past (2154 CS/LGPK, 1992).

4.4.3 Potential Impacts of Continued Operation (No Action)

No significant impacts to ground water or surface water currently occur or are projected to occur. The no action option would not produce the extensive physical disturbances of full deactivation. Underlying aquifers would not be damaged or altered by this alternative.

Continuing operation of the MM II missile system would perpetuate the potential for runoff of herbicide-laden water to adjacent water bodies. Existing traffic would continue to generate airborne dust, to degrade roads, and to cause siltation of nearby water bodies. Continued operation of the MM II missile system would have no significantly adverse impacts on water quality.

4.4.4 Potential Impacts of Partial Deactivation

Partial deactivation of one or two squadrons of the MM II system would have the same types of impacts on ground water and surface water as those under full deactivation; the magnitude of impacts in a specific area that is deactivated would be equivalent. Also, the types and magnitude of impacts described under section 4.4.3 would be the same as those for the squadron(s) that continue operating. Because most impacts on ground water and surface water are caused by deactivation, the overall aggregate impact of implementing partial deactivation would be proportional to the impacts under the proposed action.

4.4.5 Potential Impacts of Missile Removal and System Shutdown

No significant impacts to surface water or ground water are anticipated. The extent of physical disturbances and impacts associated with this alternative would be distinctly less than with the proposed action; no explosive demolition of the launcher headworks would occur, and less fill would be required. Shallow aquifers, dams, and perched water tables would not be affected by blasting. The physical environment at commercial borrow areas would be insignificantly affected by the amounts of material needed for fill at the LFs and LCFs. Some insignificant siltation of surface water bodies would occur during the short-term from increased runoff and settling of airborne particles during filling and other construction activities.

4.4.6 Potential Impacts of the Implementation Alternatives

4.4.6.1 Non-Demolition of LF Headworks

The adverse impacts would be insignificant over the short term, with the long-term benefit of no further operations in the deployment area. Because no explosive demolition would occur under this implementation option, water resources in the deployment area would be affected considerably less than under alternatives that would use explosives. The overall impacts on water resources would be greater than those predicted for the missile removal and system shutdown alternative, but still would be insignificant.

4.4.6.2 Mechanical Demolition of the LF Headworks

The quality and quantity of water resources in the deployment area would be insignificantly affected by mechanical demolition. Deep aquifers are unlikely to be disrupted by mechanical demolition of the headworks. Although some shallow fracturing of a formation could occur from mechanical demolition of the launcher headworks (less than that expected from explosive demolition), it is unlikely that waters from the different aquifers would mix to any extent greater than they normally do. Surface reservoirs would be less likely to leak if mechanical demolition were implemented but would likely incur more siltation from airborne dust settling in the surface water.

4.4.6.3 HICS Removal

If the HICS were excavated, it would likely adversely affect some aquifer discharge/ recharge areas, but not significantly. Soil erosion and siltation of surface water would occur to a greater extent under this implementation alternative than under the proposed action. In certain areas where the HICS passes adjacent to or beneath water bodies, the impact of removal would be significantly adverse.

4.4.6.4 Delay of Deactivation for One Year

The impacts to water resources would be equivalent to those predicted for the proposed action, but would begin 1 year later.

4.4.6.5 Removal of Deep-Buried LCF USTs

Insignificant adverse impacts to water resources are anticipated to occur under this implementation alternative. Excavating the deep-buried LCF USTs would increase infiltration of water and cause soil erosion which would affect the quality of surface water runoff. Approximately the same amount of fill would be required for the proposed action. Possible fill could include pea gravel, concrete slurry, or sand.

4.4.7 Mitigation Measures

Potentially significant impacts to the water resources in the deployment area have been identified. The following mitigation measures, which the Air Force could require of the deactivation contractor could lessen adverse effects of the destruction and removal process:

- Perform detailed site surveys and, where appropriate, geotechnical investigations to identify launchers close to aquifers and reservoirs susceptible to blast damage. At such locations, modified, less-disruptive blasting techniques could be used, perhaps along with more labor-intensive dismantlement procedures, such as using a jackhammer.

- Use sediment traps and liners to avoid degrading surface water quality during the proposed action.

- Provide intermittent light watering of access roads and construction sites to decrease the amount of airborne dust that increases siltation of water bodies.

- Restrict fill excavations to locations where they would not interfere with water recharge areas.

The Air Force could perform the following actions to mitigate potential effects on water quality:

- Continue operation of the cathodic protection well until final site disposition to delay the eventual corrosion of the former LF.
- Install and operate dewatering wells at LFs that have had or could have seepage problems. These facilities are often in areas with a perched water table, and dewatering wells would inhibit ground-water seepage into the launcher tube.

4.4.8 Unavoidable Impacts

Explosive demolition of the headworks would increase the potential for ground-water incursion into the launch tube. If lead-based paint and cadmium electroplating are not removed, heavy metals could gradually leach from the LCC or launch tube into the ground water, creating an unavoidable but negligible impact over the long term.

Soils in the deployment area are very erosion prone. Although different actions can minimize erosion with subsequent increased siltation of surface water, some minimal increase in turbidity through wind or water transport is unavoidable.

4.5 BIOLOGICAL RESOURCES

Native or naturalized plants and animals and the habitats in which they occur are collectively referred to as biological resources. Particularly important are plant and animal species that are protected under the Endangered Species Act.

Impacts on biological resources would be significant if large populations of protected species are lost with little likelihood of their successful existence or reestablishment after implementing the proposed action. An adverse, yet insignificant, impact would result if the disturbed population could be reestablished to its original state and condition. An increase in species population and viability, or enhanced habitat would be viewed as beneficial impacts.

4.5.1 Analysis Methods

The C-E-Q networks were used to focus the study on potential environmental impacts of biological resources. The analysis methods used to determine potential impacts of activities associated with the proposed action and other alternatives consisted of a review of existing data and previously written environmental documents for the deployment area. Part of this review focused on the particular locations of the LFs in relation to the various biological habitats in the area. Appendix F provides information on the proximity of sensitive areas and surface water bodies to LFs and LCFs. The Missouri Department of Conservation and the U.S. Fish and Wildlife Service (USFWS) were informally consulted for technical assistance in identifying significant biological resources and the status of threatened, endangered, and candidate species in the deployment area. Correspondence with these agencies is included in appendix G.

4.5.2 Potential Impacts of the Proposed Action (Full Deactivation)

No significant impacts to the vegetative, aquatic, or wildlife resources, including threatened or endangered species, from construction activities or explosive demolition are expected.

4.5.2.1 Vegetation

Agricultural land and vegetation immediately borders most LFs. However, the proposed demolition of the launcher headworks would occur in a graveled, unvegetated area within the security fence. Because of the defined area of demolition activity, no significant impacts on the surrounding vegetation from dust generated from construction activities or by explosive demolition are expected. If the fill dirt is excavated from existing borrow areas (as currently planned for the deactivation), impacts to vegetation and habitat should be negligible. However, excavating fill in previously undisturbed areas could hinder the vigor and rate of revegetation in the shallow soil types of the deployment area. Erosion from wind and water runoff could have short-term, adverse impacts on adjacent crops.

Removal of the azimuth markers and line-of-sight poles, performed by the Air Force at the request of the landowner, and removal of utility poles, performed by the utility companies serving the area at their option, would disturb some areas of vegetation throughout the deployment area and consequently leave those areas susceptible to erosion from wind and water. The amount of land disturbed would be negligible, and no significant impact to vegetation is anticipated.

4.5.2.2 Aquatic Resources

Ground disturbance during deactivation at the LFs and LCFs could increase soil erosion from wind and water runoff, having a short-term adverse impact on aquatic resources in the vicinity. Additional ground disturbances would occur at the borrow areas and where azimuth markers and utility poles would be removed. Increased erosion would increase siltation in surface waters, having a potential adverse effect on fishery and wetland areas by disrupting habitat and altering water quality.

Temporary increases in turbidity could be expected, which could have an effect on benthos, invertebrates, and fish. Although adverse, the temporary impact to the water quality and aquatic resources would be insignificant.

4.5.2.3 Wildlife

Increased human activity and noise levels in the immediate vicinity of the LFs could adversely affect wildlife in the area. Resident wildlife could be temporarily displaced during the proposed action, causing short-term, increased competition for available habitat. Because the increased activity and noise would be short term, no significant impacts, such as habitat abandonment or decreased reproduction in feral or domestic herds, are expected.

The effects of demolition or blasting noise on wildlife, specifically migratory threatened and endangered species, such as the bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus*), have not been extensively studied. The effects of sonic booms and multiple event noise-producing activities on domestic animals and wildlife have received a considerable amount of attention. These multiple noise event studies are used in the analysis of potential noise effects from LF demolition.

The effects of noise on wildlife will vary with species' hearing ability, habitat variation, and noise source. Wildlife rely on their hearing ability to avoid predators, to communicate, and to find food. Species differ immensely with regard to their response to noise. Their response can be determined by noise type and duration, time of day and year, animal's physical condition, environment, experience with similar noise events, and other stressors, such as drought.

A sudden or unfamiliar sound, such as the blasting of LF headworks, is believed to act as an alarm, activating the sympathetic nervous system. The sympathetic nervous system invokes physiological stress reactions and can cause a "fight-or-flight" reaction.

This reaction is similar for many vertebrate species. The most common reactions to this alarm include trampling, raising the head, jumping, running, and flying. A similar reaction would occur if a predator or competitor entered an individual's habitat area.

Reactions to sudden noise, such as blasting, would be similar to reactions to sonic booms. When sonic booms occur, birds run, fly, or crowd. Reactions vary from boom to boom and are not predictable.

A study was performed for the Idaho Power Company, the Bureau of Land Management, and the Pacific Gas and Electric Company on the response of the prairie falcon to impulsive noise (Russell, 1990). In this study the falcons were exposed to peak sound levels between 129 and 141 decibels (dB). Each aerie was exposed to an average of 90 events over a period of 62 days. Pre-event behavior was compared to post-event behavior. The falcons usually responded to the impulsive noise by continuing their pre-event behavior or by a short flight followed by their pre-event behavior. During the 4 year study, there was no evidence of their becoming accustomed to the noise. Yet, the occupancy of the nesting areas exposed to the noise remained the same the year after the impulsive noise events. In general, this study found that construction and recreation activities lacked detectable adverse effects on nesting prairie falcons.

A study was done to determine the tolerance of the nesting ferruginous hawk (*Buteo regalis*) to geothermal development (Russell, 1990). During a 2-year period, the authors subjected a hawk's nest to various noise sources, such as motors, gunshots, and walking. While the ferruginous hawk did react to these disturbances, little nest failure was witnessed.

Data on the likely effects of low-level jets and sonic booms on nesting peregrine falcons and other raptors were gathered at areas in Arizona. Responses to extremely frequent and nearby jet aircraft were often minimal and never associated with reproductive failure. Nesting success and site reoccupancy rates were high for all areas. The birds observed were noticeably alarmed by the noise stimuli (82 to 114 dB), but the negative responses were brief and apparently not limiting to productivity (USFWS, 1988).

Any of the migratory species of concern in the deployment area would likely be subject to only one significant noise event because of the 4- to 7-mile distance between LFs. While prolonged exposure to severe stress caused by noise exposure may exhaust an animal's resources and result in death, the animal species of concern would not experience prolonged exposure or multiple significantly loud or alarming noise events and, thus, would likely not experience severe stress or adverse effects.

Environmental noise, such as wind and falling rain, are predominantly of low frequency, and the avian ear filters incoming sounds at lower frequencies. The sound of a distant blast would be similar to low rumbling thunder and would likely be ignored.

If borrow is taken from an area of natural recharge, an impoundment or wetland could be created, resulting in new or enhanced wildlife habitat in the immediate vicinity.

Because the Air Force will require that only existing borrow pits be used, is unlikely that the pits would be excavated to the extent that they fill with water.

4.5.2.4 Threatened, Endangered, and Candidate Species

No known threatened, endangered or candidate plant or animal species occur on LF or LCF property. As described in section 3.5.4, LFs and LCFs are not conducive to plant or animal residence. Protected birds that may migrate through the deployment area, such as the peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*), may be temporarily startled by the demolition noise, but as stated in correspondence from the USFWS and Missouri Department of Conservation (appendix G), no significant adverse impacts are foreseen. Because of the finite nature of the demolition noise and the distance between LFs, it is not expected that the same bird would be startled more than once.

It is possible that the line-of-sight poles may be used as convenient roosting sites. Because these markers would be removed only at the landowner's request, and other available roosting sites are prevalent within the deployment area, no significant impacts to biological resources from the removal of these potential roost sites are anticipated.

4.5.3 Potential Impacts of Continued Operation (No Action)

The current impacts to biological resources are insignificant. Because the continuation of operations is primarily routine missile maintenance and replacement, no ground disturbance or demolition occurs. The no action alternative has no significant impacts on the biological resources. Under this alternative, any impacts to the resource would remain unchanged.

4.5.4 Potential Impacts of Partial Deactivation

The potential impacts likely to occur to biological resources in the deployment area from partial deactivation are expected to be insignificant and of the same type as those projected under the proposed action. The impacts discussed in section 4.5.2 would apply if this alternative is implemented, but would likely occur to a lesser extent because of the reduced scope of deactivation activities.

4.5.5 Potential Impacts of Missile Removal and System Shutdown

The overall effects, both short- and long-term, on biological resources would be negligible under this alternative. No demolition would occur under this alternative, and less ground disturbance would occur than under the proposed action. Routine missile maintenance and replacement would cease for an undefined period of time once the system is placed in an inactive status; therefore, any impacts to the biological resources that occur from these activities would also cease during the inactive period and would have a beneficial impact on biological resources. Although aquatic resources

could be adversely affected, no significant impacts to this or other biological resources are projected to occur.

4.5.6 Potential Impacts of the Implementation Alternatives

4.5.6.1 Non-Demolition of the LF Headworks

The likely potential impacts on biological resources in the deployment area would be insignificant, and would be of less magnitude than those impacts predicted for the proposed action and partial deactivation alternative. Because explosive demolition would not be used, wildlife would not be startled by a loud, instantaneous event. The short-term impacts would be similar to those described for the proposed action, except for the proposed action's use of explosives and the need for less fill for the non-demolition option.

4.5.6.2 Mechanical Demolition of the LF Headworks

It is unlikely that biological resources would experience significant adverse effects by the mechanical demolition of the headworks. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would occur over a longer period of time. Consequently, startling would occur more often but be less severe than the effect generated by an explosive demolition event. Over time, the startling effect would decrease because a normal pattern of construction activity would be established. Impacts to domestic animals and wildlife from mechanical demolition are anticipated to be insignificant.

4.5.6.3 HICS Removal

Significant adverse impacts to biological resources from removing the HICS could occur because of increased soil erosion and human disturbance throughout the deployment area. Removing the HICS system would require a backhoe, crane, dump truck, and flatbed truck. This equipment would cause a significant impact to vegetation and agricultural and naturally occurring species in areas that would be excavated. It would be necessary for the vehicles and equipment to travel across the fields where the HICS are buried. This could cause soil erosion, crop damage, and significant impacts to domestic animals and wildlife.

4.5.6.4 Delay of Deactivation for One Year

The likely potential impacts on biological resources would remain the same both in the short and long term as those of the proposed action, as discussed in 4.5.2, but would begin 1 year later.

4.5.6.5 Removal of Deep-Buried LCF USTs

The potential impacts on biological resources would essentially be the same as the impacts predicted for the proposed action. Slightly more soil disturbance and equipment noise would occur at the LCFs under this alternative than would occur under the proposed action. The impacts to the biological resources would be insignificant.

4.5.7 Mitigation Measures

Potential impacts can be avoided or minimized with the following mitigation measures:

- Construct temporary barriers and silt traps during deactivation to reduce runoff and siltation.

- Establish warm-season grasses at the LFs and LCFs after deactivation to prevent further erosion and runoff.

- Leave line-of-sight poles and utility poles in place at selective locations for use as bird roosts.

4.5.8 Unavoidable Impacts

A short-term loss of vegetation, aquatic and wildlife resources, and habitat could be an unavoidable adverse impact caused by the proposed action or similar alternatives. The noise disturbance and airborne emissions from explosive or mechanical demolition would have minor, unavoidable effects on any wildlife and domestic animals in the vicinity.

4.6 CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES

Cultural, archaeological, and paleontological resources are limited, nonrenewable resources whose values may be easily diminished by physical disturbances. These three resource elements constitute those items, places, or events considered important to a culture or community for reasons of history, tradition, religion, or science. The criteria used to determine the significance of impacts on cultural resources include the effects on National Register of Historic Places (NRHP) eligibility, future research potential, or suitability for religious or traditional uses. Impacts would be significant if they result in the physical alteration, destruction, or loss of a resource listed or eligible for listing in the NRHP or considered important to Native American groups. Not withstanding impacts caused during the installation of the MM II system facilities, significant impacts could also occur if important or rare paleontological specimens of the area are damaged or destroyed by detonation of explosives in the launcher, by subsequent digging and removal of the top part of the launcher, by excavations at the LFs and LCFs, or by optional removal of line-of-sight poles and utility poles. Adverse impacts would be insignificant if only slight portions of the resource were affected or if the value of the resource is not very great. The proposed action would be beneficial if it protected or reconstructed the resource.

4.6.1 Analysis Methods

The analysis consisted of a review of existing data, publications, and previously written environmental documents to determine the extent and value of cultural, archaeological, and paleontological resources that may be affected. Appendix F presents the proximity of NRHP sites from LFs and LCFs. The C-E-Q networks were consulted to guide the analysis. The Missouri State Historic Preservation Officer (SHPO) was informally consulted for technical assistance in identifying resources of specific concern or value in the deployment area. Appendix G includes correspondence to and from the SHPO.

4.6.2 Potential Impacts of the Proposed Action (Full Deactivation)

Because the LF, LCF, and right-of-way areas have been extensively disturbed and modified over the years, the likelihood of revealing or affecting intact cultural or paleontological resources in the deployment area is negligible; thus, no significant impacts are anticipated.

4.6.2.1 Cultural and Archaeological Resources

Most LFs and LCFs are in upland areas, not within areas viewed as high-density zones for archaeological resources, such as areas adjacent to streambanks, river terraces, or vertical changes in topography. The deactivation activities proposed at the LFs and LCFs would occur primarily within the security fences in previously disturbed terrain. Removal of the azimuth markers, line-of-sight poles, or utility poles could also occur. Because the LF, LCF, and right-of-way areas have been extensively disturbed and

modified over the years, the likelihood of revealing or affecting intact resources in the immediate area is negligible. No significant impacts are anticipated.

The need for fill dirt at the LFs and LCFs could affect archaeological resources at the borrow areas. Previously unrecorded resources could be exposed as fill dirt is excavated. Recording of these sites and documentation of any discovered artifacts would be a beneficial impact.

Ground vibrations that would occur during demolition of the launcher's headworks could physically damage or alter any nearby historic properties, resulting in a long-term, adverse impact to the characteristics that qualify the property for NRHP inclusion. However, the blasting specifications governing explosive demolition are designed to prevent damage to nearby structures. The amount of explosives expected to be used would cause only a slightly noticeable ground tremor and would likely not affect archaeological resources in the area. No NRHP listed site or structure is located on LF or LCF property. Most listed historic and architectural resources occur in community settings distant from any LFs. Appendix F lists NRHP sites that are within 5 miles of an LF or LCF. For the aforementioned reasons, it is unlikely that these resources would be affected by the proposed action; no significant impacts are anticipated.

The construction and deployment of the MM II missile was significant in the history of Missouri and the United States. The MM II missile system is eligible for nomination to be listed on the NRHP; therefore, complete deactivation of the system and demolition of the LFs would be a significant, adverse impact on this historic resource. However, the on-base LCF (Oscar-1) and the on-base LF trainer (T-12) are scheduled to be retained. Classified information and items would be removed from the facilities to allow escorted tours of the facilities. Additionally, the potential exists for the State of Missouri to pursue retaining an off-base LF and LCF as a historical park in reference to the Cold War.

Few Native American resources are known or expected to occur in the direct impact area of the LFs. Because no Federal Native American lands are located within the deployment area, it is unlikely that noise or demolition activities would disrupt religious or traditional activities.

4.6.2.2 Paleontological Resources

Because areas within the LFs and LCFs and areas where the guidance alignment marker poles and utility poles are located have been previously disturbed, significant adverse impacts to any paleontological resources are unlikely. The need for fill dirt at the LFs and LCFs could adversely affect paleontological resources at the borrow sites. However, because most of the fossils found within the deployment area represent the marine communities of the Pennsylvanian Period, they are not considered important to the paleontological community (USAF, 1990), so it is unlikely that significant resources would be disturbed.

4.6.3 Potential Impacts of Continued Operation (No Action)

Because the continuation of operations primarily involves routine missile maintenance and replacement and no ground disturbance or demolition occurs, impacts on cultural resources would be insignificant. Under this alternative, any impacts to the cultural, archaeological, and paleontological resources would remain unchanged.

4.6.4 Potential Impacts of Partial Deactivation

The potential impacts of resources in the deployment area likely to occur as a result of partial deactivation are not anticipated to be significantly different from the proposed action. The types of impacts discussed in section 4.6.2 would apply if this alternative is implemented, but they would likely occur to a lesser extent because of the reduced scope of deactivation activities.

4.6.5 Potential Impacts of Missile Removal and System Shutdown

No significant impacts are expected to the resources under this alternative. No demolition would be used under this alternative and less ground disturbance would occur than under the proposed action. Routine missile maintenance and replacement would cease for an undefined period of time once the system is placed in an inactive status; therefore, any impacts to cultural resources would also cease. The overall short-term impact on cultural resources would be insignificant. The long-term impact on the cultural resources within the deployment area would be dependent on the eventual use of the sites.

4.6.6 Potential Impacts of the Implementation Alternatives

4.6.6.1 Non-Demolition of the LF Headworks

The potential impacts to the cultural resources in the deployment area likely to occur would be insignificant and decidedly less than those predicted for the explosive demolition alternatives. Because explosive demolition would not be used, the physical resources would not be subject to fracture or toppling. The short-term impacts of the non-demolition option would be similar to those described for the proposed action, except no explosives would be used and less fill would be needed. The long-term impacts would be similar to those described for any deactivation alternative.

4.6.6.2 Mechanical Demolition of the LF Headworks

It is unlikely that significant impacts to the resources would occur under this alternative. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would cause less ground shaking to the area surrounding the LF than the use of explosives. This alternative might further reduce the slight potential to disturb historical structures or unknown archaeological resources.

4.6.6.3 HICS Removal

No significant impacts are anticipated from this alternative. Removal of the hardened intersite cable system (HICS) would require the use of a backhoe, crane, dump truck, and flatbed truck. This equipment would be used to excavate a trench in soil to help remove the HICS. This alternative would not likely damage resources because the ground was previously disturbed during the original installation of the HICS.

4.6.6.4 Delay of Deactivation for One Year

The likely potential impacts on cultural resources would be the same as the short- and long-term impacts of the proposed action, as discussed in section 4.6.2, but would begin 1 year later.

4.6.6.5 Removal of Deep-Buried LCF USTs

No significant impacts are likely under this implementation alternative; the potential impacts on cultural resources would be equivalent to those of the proposed action. Because the ground was previously disturbed, excavating the USTs would not further affect cultural resources.

4.6.7 Mitigation Measures

Cultural resources that are listed, or eligible for listing, in the NRHP are protected under specific Federal laws. The following are some potential mitigation measures that the Air Force contractors could perform:

- Consult an archaeologist or paleontologist if previously unrecorded resources are excavated in borrow areas.

- Estimate the extent of the ground shaking activity to determine whether the magnitude of the explosive demolition event at an LF could be reduced to ensure that any impact to nearby historic or architectural structures remains negligible.

The Air Force recognizes the important and historical role the MM II system had in protecting the United States. To mitigate impacts to this resource, the Air Force would:

- Maintain the historic importance of the MM II missile system by working with the SHPO on the potential listing of the system in the NRHP. Document and record locations of the LFs for future reference. Prepare a history of the project (construction, intent, significant dates and events, etc.). Retain Oscar-1 (an LCF located on base) and T-12 (an LF trainer located on base) as historic structures, subject to START verification requirements.

Implementation of the aforementioned measures to preserve the historical value of the MM II system would mitigate the adverse impact of destroying the system without adequate preservation efforts; the impacts to the MM II system as a historic resource would be insignificant.

4.6.8 Unavoidable Impacts

In an area with unknown cultural, archaeological, or paleontological resources, some fill could be excavated before the resources are recognized. It is possible that a very localized resource could be destroyed by excavation before its characteristics and significance have been surveyed and recorded.

The complete demolition and removal of the entire MM II system in the Whiteman AFB vicinity would be an irretrievable loss of a historic resource.

4.7 HEALTH AND SAFETY/HAZARDOUS MATERIALS/SOLID WASTES

Human health and safety may be affected by activities associated with the proposed action and alternatives. Air Force and contractor personnel performing the actions would be expected to follow protective guidelines and regulations when handling explosives and hazardous materials and when transporting missile components.

If the workers or the general public are involved in transportation accidents or exposed to hazardous materials, such as sodium chromate solution, PCBs, or explosives, human health and safety could be significantly affected. Adverse, significant impacts could also occur if workers violate required operating procedures for these materials. The removal of USTs, PCBs, asbestos-containing materials, sodium chromate solution, and nuclear material would have beneficial effects in the deployment area. Beneficial impacts would also occur if the amount of hazardous materials used and hazardous wastes generated and disposed of is decreased or if previous wastes are removed or cleaned up.

4.7.1 Analysis Methods

The analysis methods focused on the concerns related to the handling of explosives, the handling of hazardous materials and wastes, and the risks of transporting rocket motors (missile boosters). The first step in analyzing hazardous materials was to investigate the methods prescribed for handling explosives and hazardous substances to determine whether handling the substances poses a significant health risk. The level of personnel training was also evaluated. The likelihood of a transportation accident was evaluated, as were the potential effects if the accident involved a missile booster that ignited or caught fire from the accident. Documents pertaining to handling precautions, toxicity of substances, and transport risk were studied.

The analysis was based on available information on the presence and use of hazardous materials in the LFs and LCFs in relation to existing regulatory requirements. The types of activities proposed under deactivation and specified guidelines for performing the actions were reviewed.

Accidents in handling and transporting missiles are potential human health and safety risks; therefore, the analysis focused on the three primary elements of such risks: the hazard/accident mechanism, the accident likelihood, and the severity of human health consequences if such an accident were to occur. Military and civilian transportation statistics were used in addition to information from knowledgeable military personnel.

4.7.2 Potential Impacts of the Proposed Action (Full Deactivation)

Impacts to the health and safety of workers, the general public, and to the environment are expected to be insignificant because of the low probability of accidents, exposure, and release of hazardous substances. Once these substances are removed from the deployment area, a long-term beneficial impact would result.

4.7.2.1 Transportation and Handling Safety

Removing missiles from their launch tubes and transporting them to storage or elimination facilities poses a low likelihood of accidents during transportation, with an even lower chance that such accidents could damage public health or the physical environment.

Moving the missile components to and from the deployment area for maintenance is an ongoing activity. Deactivation would slightly increase the pace of this activity in the short term. To the extent that a small transportation hazard exists, it would be further reduced once the conversion program has been completed. Though the impacts could be severe within the immediate area of an accident involving a propellant fire or the release of radioactive materials from an RV, the probability of such an event is extremely low (USAF, 1986; USAF, 1987; USAF, 1989). Appendix E describes the potential impacts resulting from various severe transportation accident scenarios. Once the RV is removed from the LF no radioactive materials would be present on site.

Trained personnel would remove the ballistic gas generators from the LF. This procedure would occur after the missile had been removed from the launch tube. There has never been an accidental actuation of the device at LFs in the Whiteman AFB deployment area.

The RV, which contains the nuclear warhead, would be handled by trained personnel. As discussed in section 3.7.1, the RV continuously emits ionizing radiation in the form of alpha and beta particles, gamma rays, and X-rays at a very low rate (approximately 1 millirem (mrem) per hour), as measured at a distance of 3 feet from the RV. This rate is far less than the average radiation dose of 300 mrem per year from naturally occurring radiation. At a distance of 10 feet, the radiation emitted by the RV would be undetectable. Workers handling the RVs would be exposed to approximately 1 mrem of radiation above normal background levels while they are near the RV. For illustrative purposes, a worker continuously standing 3 feet from a warhead for 1 full work year would receive less than 2.5 rems per year. This amount of radiation is below the allowable occupational dose of 5 rems per year specified in 10 CFR 20.1201. Thus, worker exposure to ionizing radiation from the RV is not a significant impact.

The RV handling procedures are designed to prevent a mishap with the nuclear device, and no incidents of detonation have occurred at any intercontinental ballistic missile site. Because of the extremely improbable nature of a detonation during handling, this scenario is eliminated from further evaluation.

Explosive demolition of the headworks has an associated risk of mishandling of the explosives or improper detonation. The risk of accident is extremely small because the explosives that would probably be used in the LF demolition activities (TOVEX® and ANFO, with small charges of TNT) are stable explosives and would not detonate without an electrical impulse signal. If the explosives detonated before personnel were beyond a prescribed safety distance, which would be required in the demolition contract,

personnel might be injured. However, a demolition team experienced in handling explosives would perform the work under prescribed requirements and guidance. No adverse impacts on human health and safety from using explosives are anticipated.

Recently, the maintenance program at the base was highly active. Missile movements have decreased during the past year, and only failure movements are now being performed. Assuming that the accident rate for personal injuries remains constant, it is likely that there would be an increase in injuries during demolition because of the increased workload. The tasks would be identical to previous maintenance tasks, and maintenance training activities and safety inspections have been ongoing. As a result of these considerations, any increase in personal injuries would likely be insignificant.

4.7.2.2 Hazardous Materials/Hazardous Wastes

Hazardous materials collected and hazardous wastes generated during the deactivation process and related activities would be managed in accordance with all applicable Federal, State, local, DoD, and Air Force rules and regulations. Even though the hazardous waste generation from the LFs and LCFs would be minimized during the deactivation process of the MM II missile system, there would be some short-term consequences, such as the overall increased generation of hazardous waste, and the need for additional storage of hazardous materials and hazardous wastes until further action is taken on the disposition of these materials and wastes. Because each LF and LCF is a conditionally exempt, small quantity generator of hazardous waste and there are potentially only small amounts of hazardous waste generated from the proposed action, it is unlikely that this condition would change. Therefore, it would not be necessary for each site to obtain an EPA identification number.

As the deactivation continues, the elimination of the operation and maintenance of the MM II missile system and the support activities is expected to decrease the overall quantities of hazardous wastes generated by Whiteman AFB. Thus, this would be a beneficial impact in the long term. If any contamination was found after the dismantlement and restoration of the LFs and LCFs, long-term remediation may be handled under the base's Installation Restoration Program.

Although unlikely, spills of hazardous materials or wastes could occur and contaminate surface or ground water during deactivation (see section 4.4.2). If the contamination would migrate through the water pathway, it is possible that other resources could be adversely effected (e.g. mineral resources; see section 4.3.2.2). Spills would be contained according to the Spill Prevention and Response Plan (discussed in section 3.7.2) for Whiteman AFB and requirements specified in the dismantlement contract. Hazardous materials and wastes removed from the sites would be properly packaged to minimize the chance of a spill. The materials would be moved during many separate trips for the separate facilities; thus the amount of material being moved or handled in any given day would be limited. Because of the limited quantities of hazardous materials and wastes being handled or transported at a given time and location and the requirements to remediate spills, no significant impacts caused by spills are projected to occur. No

additional mitigation measures are required because the existing transportation and handling requirements, as well as the prescribed spill response activities, are sufficient to minimize the risk of spill impacts.

The proper removal and disposal of asbestos wastes, hazardous materials, and hazardous wastes would have short- and long-term beneficial impacts on the public. The following subsections pertain to the material's toxicity and to precautions that workers must take when handling these materials.

4.7.2.2.1 Asbestos

The exhaust system of the diesel electric units (DEUs) at the LCFs contains asbestos and would be removed as part of the deactivation process. The Occupational Safety and Health Administration (OSHA) requirements specified in 29 CFR 1910, the National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements specified in 40 CFR 61, and all applicable State requirements for workers handling asbestos and the emission controls would be followed. A permissible exposure limit to asbestos was set at 0.2 fibers/cm^3 (approximately 6 $\mu g/m^3$) by OSHA (29 CFR 1926.58). Supervisors and workers State-certified in asbestos removal would wear appropriate protective clothing and respirators when handling the diesel exhaust system. Although no asbestos other than the diesel exhaust system is scheduled for removal from the LCFs, and there is no known asbestos at the LFs, workers would be made aware of likely spots where asbestos might be encountered and would take appropriate measures as required. For any other areas suspected to contain asbestos that could be affected by the work involved and are not identified within the contract, additional asbestos sampling could be performed. After demolition or renovation and before a site can be considered environmentally safe for a real estate transaction, all friable asbestos must be encapsulated or removed from LFs and LCFs, the site must be approved by Air Force representatives, and the asbestos waste disposed of in a designated landfill in accordance with the NESHAP requirements specified in 40 CFR 61.152(a). Also, any asbestos left at the LFs and LCFs would be subject to the provisions of CERCLA for real estate transactions.

Areas of asbestos-containing materials within the LCFs, including the support buildings, that pose no health risk to facility occupants would not be removed. The potential impact to workers and the general public from asbestos removal is insignificant if safety precautions, proper packaging and labeling, and proper disposal procedures are followed. Removal of asbestos from the LFs and LCFs would constitute a long-term benefit to the environment.

4.7.2.2.2 Polychlorinated Biphenyls

Electric filters within the equipment at the LFs and the LCFs are suspected of containing polychlorinated biphenyls (PCBs), which are suspected human carcinogens. All of these filters suspected of containing PCBs, including the main power filters, would be extracted by base personnel. Air Force guidance for removing the suspected PCB items specifying the required protective gear necessary for removal of PCBs would be adhered

to by the base personnel. All of the filters would be properly packaged, labeled, and transported to a storage site on base that meets the specified criteria outlined in 40 CFR 761 and 49 CFR 172 and then disposed of through the Defense Reutilization and Marketing Office (DRMO). All PCB-containing waste would be disposed of in accordance with regulations (40 CFR 761) promulgated under the Toxic Substance Control Act (TSCA) and in accordance with the disposal regulations under the Missouri Hazardous Waste Management Rules. No adverse effects to human health and safety are anticipated during handling of the suspected PCB items. Once they are removed from the deployment area, a long-term beneficial impact would result from eliminating PCB-containing items from the former LF and LCF sites.

4.7.2.2.3 Sodium Chromate Solution

The sodium chromate solution and cooling units used to store the solution would be removed from the launcher by the Air Force personnel. The sodium chromate solution would first be drained from the cooling units, properly containerized, and transported back to the base for temporary storage until final disposition is determined. The cooling units would also be removed, transported back to the base, and properly disposed. Air Force guidance outlining specific removal procedures, including the use of protective gear and clothing, would be adhered to during the removal. The hexavalent chromium in sodium chromate solution is a known human carcinogen. Dimethoxane, an antimicrobial agent added to the solution, is an ester of acetic acid, has a low acute oral toxicity, and is considered a carcinogen (Gosselin et al., 1984). Sodium hydroxide is a caustic substance.

A representative sample of the sodium chromate solution obtained from a missile site was analyzed utilizing the toxicity characteristic leaching procedure (TCLP). It was determined that the leachable total chromium concentration exceeded 5 mg/L; thus, the solution will be considered a hazardous waste and will be subject to the requirements of RCRA and the Missouri Hazardous Waste Management Rules.

The potential impact to the health and safety of workers and the general public from removing the sodium chromate solution and tanks is negligible if safety precautions, proper packaging, and proper disposal procedures are carried out. There are long-term benefits of removing the sodium chromate solution from the deployment area.

The Air Force is preparing a sampling plan to look at possible contamination of soils from past activities at LFs and LCFs. Three random sites will be sampled as part of a reconnaissance program. The Air Force will meet with representatives from the Missouri Department of Natural Resources to determine potential further actions to ensure that there is no significant health or environmental risk attributable to the LF and LCF sites. The sampling will be performed separately from this EIS and is planned to occur prior to the inception of the dismantlement phase of the deactivation. The soil will be sampled for many possible contaminants, including heavy metals (e.g, chromium from sodium chromate solution) and pesticides. Sampling results could influence any major action concerning deactivation of the MM II missile system. For example, sample

concentrations significantly above background levels could require consideration of remedial action before demolition of the launcher headworks.

4.7.2.2.4 Diesel Fuel

Only shallow-buried diesel underground storage tanks (USTs) would be removed as part of the deactivation process. Deep-buried USTs at LCFs would be left in place. Any evidence of fuel contamination found during the excavation of the USTs would be cleaned up. The piping connected to the underground storage tanks and the DEUs would also be removed. The tanks and piping would be purged and drained of diesel fuel before disposal. The deactivation criteria and guidance to the contractor would specify the proper methods for handling and removal of the USTs, and no significant adverse impacts to human health and safety are anticipated as a result. Removal of diesel fuel from the deployment area would be a long-term beneficial impact to the environment.

As discussed in section 3.7.2.4, diesel fuel (DF-2) stored at the LFs and LCFs would be disposed of as a hazardous waste if it was not used or recycled. However, the contract for the deactivation process would include a bid item for the DF-2 to be sold by the contractor to a refiner for reprocessing.

4.7.2.2.5 Ethylene Glycol

The ethylene glycol within the coolant systems at the LFs and LCFs is isolated and does not come into contact with any other hazardous materials or waste products. Consequently, the ethylene glycol is not considered a hazardous waste.

The Air Force personnel would drain the ethylene glycol from the LF and LCF coolant systems (but not from the diesel electric units) before the site is placed in caretaker status. The Air Force has ordered a distillation unit that would be used to remove the impurities from the used ethylene glycol so that the ethylene glycol may be reused by other organizations on base. The contractor would leave the ethylene glycol in the diesel electric units before they remove them.

The refrigerant system contains freon—a chlorofluorocarbon—which is part of the coolant system. The coolant system would be removed from the LFSB and the LCF as a unit to prevent disturbing the freon; venting of ozone-depleting chemicals into the atmosphere is prohibited by Section 608 of the Clean Air Act. The EPA is developing regulations regarding recycling and disposing of chlorofluorocarbons. Upon adoption of the regulations, the Air Force and dismantlement contractor would abide with the additional requirements. Proper handling procedures of the diesel electric units and the refrigerant system would be specified in the guidance to the contractor so that no significant impacts to human health and safety would result. There are long-term benefits of removing these items with these substances from the deployment area.

4.7.2.2.6 Lead-Based Paint

The interiors of the MM II launchers, launch control centers (LCCs), and launch control equipment buildings (LCEBs) were painted with lead-based paint. Other paint additives may include heavy metals such as chromium and mercury. Cutting of the painted metal with torches during salvage operations, and after the headworks demolition to allow the broken concrete to fall into the launch tube, would produce gaseous lead emissions. Also, explosive demolition of the launcher would cause a small amount of paint dust and chips to become entrained in the resulting plume. Human health and safety could be adversely affected by releases of lead and other heavy metals into the environment. Appendix C summarizes some toxicological studies of heavy metals that are at MM II sites.

There are several health-based standards for heavy metals, including the NAAQS standard for lead on a quarterly average; an occupational permissible exposure level (PEL) designated by OSHA expressed as an 8-hour time-weighted average; and a threshold limit value (TLV), also expressed as an 8-hour time-weighted average, suggested by the American Conference of Governmental Industrial Hygienists (ACGIH, 1989). Table 4.7.2.2.6-1 illustrates the NAAQS, PEL, and TLV for heavy metals likely to be in the launch tube before demolition.

Table 4.7.2.2.6-1
Health-Based Air Standards

	Micrograms Per Cubic Meter		
Pollutant	**NAAQS**	**PEL**	**TLV**
Lead	1.5	50	150
Cadmium	-	200	10
Chromium	-	1,000	50
Mercury (Vapor)	-	50	50
Mercury (Inorganic)	-	100	100

Modeling of the release of lead to the air from explosive demolition of the headworks was performed. The technique and results of the air analysis are explained in section 4.2. The model predicted hourly averaged lead concentrations of 3.87, 1.06, and 0.26 $\mu g/m^3$ at 250, 500, and 1,000 meters respectively. The air modeling was performed with conservative assumptions (which are likely to overestimate concentrations), and the predicted concentrations for 1-hour exposures were well below the NAAQS, OSHA, and ACGIH standards. The NAAQS standard is based on a quarter-year average, and one incident of an emission on the order of 1-hour at a concentration of 3.87 $\mu g/m^3$, when averaged over 3 months, would be more than two orders of magnitude less than the standard. Air concentrations of other heavy metals are projected to be less than those

estimated for lead. Based on a comparison of the predicted air concentration to the health-based standards, no significant adverse impacts to health are anticipated.

Workers within the launch tubes who are cutting steel coated with lead-based paint would be required to wear suitable protective clothing and respirators. The workers should not be exposed to lead fumes if they wear suitable protective gear in the work area. Exhaust fans and a fume filtering system outfitted with high-efficiency particulate air (HEPA) filters would be required as a precaution to keep lead dust from escaping into the environment when steel is being cut.

The potential exists for a long-term impact to ground-water quality from lead and other heavy metals that could leach from the launch tube, LCC, and LCEB interiors (see section 4.4.2.1).

The LF, LCC, and LCEB would no longer be used for their intended purpose according to the deactivation action and would be disposed of. A representative sample of the waste stream would be tested according to the TCLP (40 CFR 261, Appendix I). If the TCLP criteria is met or exceeded for lead (5 mg/L) or any other heavy metals, such as chromium (5 mg/L) and mercury (0.2 mg/L), then the waste would be classified as a hazardous waste subject to regulation under Subtitle C of RCRA and the Missouri Hazardous Waste Management Rules. Also, if Missouri agrees to disposal in place, the waste may require treatment before in-place disposal in accordance with Missouri land disposal restrictions.

If the sites are regulated as hazardous waste sites, long-term aspects of the former LFs and LCFs (e.g., property reuse and disposition) may be affected. Although the property can still be leased, remedial action remains the responsibility of the agency that generated the hazardous waste or caused the release. Remediation need not be carried out before the property is leased; however, the Air Force would retain the liability for the cleanup. The deed for the conveyance of the sites after they have been properly closed would specify the clean state of the site. As a hazardous waste facility, each launcher would need a permit and plans for maintaining and monitoring the facility. The process for obtaining a permit from the State is costly and may involve several years of effort. As a past user of the site, the Air Force could be liable for future remediation efforts under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). For example, if heavy metals from the LCC or LF reach a potable well, the Air Force would be liable under CERCLA.

If the waste in the launchers and LCCs is not a hazardous waste as determined by the TCLP or is rendered nonhazardous, the site would not become a RCRA hazardous waste site but could still be a solid waste site regulated under Subtitle D of RCRA (implemented in Missouri by the Missouri Solid Waste Rules). Because the use of the LF to store construction debris would be a beneficial use and conserve landfill space, it is likely that Missouri DNR would exempt the sites from regulation as solid waste landfills. Regardless of whether the site would be considered a hazardous waste or solid waste site, the site would be subject to the liability provisions under CERCLA.

4.7.2.2.7 Pesticides

A computer model GLEAMS was used to estimate the possibility of residues of pesticides, specifically herbicides, remaining in the soil from long-term use (section 4.4). The proportion of these pesticides that migrate by runoff and leaching was also determined from GLEAMS modeling. Results from the model runs are discussed in section 4.4 and show that the pesticide residues are nearly totally degraded within 1 year of application, except residues of Pramitol® 25E. Residues of Pramitol® 25E in the top 10 cm of soil were calculated as high as 8 ppm in the second year of application, with residues of 6 ppm remaining approximately 3 years later. Soil samples at various LFs will be taken before deactivation to check for herbicide residues (see section 3.7.2.7). A comparison with the modeled data will be made when the sample data are available. If the residues were persistent, workers would be exposed to inhalation and dermal penetration of the herbicides through the construction activities that would disturb the upper soil layer and the headworks demolition, which would loosen the soil and entrain some herbicide-laden soil.

In addition to the modeling of lead concentrations as discussed in section 4.7.2.2.6, the air model was used to predict concentrations of Pramitol® 25E from the explosive demolition of the headworks. Although no TLV has been set for prometon, the active ingredient in Pramitol® 25E, the Environmental Protection Agency (EPA, 1992) has set an oral reference dose, or acceptable daily intake level, of 0.015 mg/kg/day based on the lowest systematic no observed effect level (NOEL) level of 15 mg/kg/day. The highest predicted concentration of Pramitol® 25E was 1.6 x 10^{-5} mg/m^3 at a distance of 250 meters from the LF. Residues of other pesticides were determined to be less than those for prometon, and the predicted air concentrations would be directly proportional to the predicted values for prometon. At these minute concentrations, the potential exposures of workers and the general public to pesticide residues during explosive demolition or site disturbance would be insignificant.

Appendix C provides a brief description of some toxicological information about the pesticides used at the LFs and LCFs.

4.7.2.2.8 Mercury Switches

The sump pump switch within the LFs and the LCFs, the switch within the air-conditioning system at the LCFs, and the thermostat in the electric unit heater at the LCFs contain mercury and would be removed by Air Force personnel. The mercury-containing items would be transported back to the MSB for temporary storage for reuse. If the items are not reusable, they would be properly disposed of through the DRMO in accordance with all applicable regulations. The potential impact to the health and safety of workers and the general public is negligible if safety precautions, proper packaging, and proper reuse or disposal procedures are carried out. There are long-term benefits of removing the mercury-containing items from the deployment area.

4.7.2.2.9 Cadmium Electroplating

The small areas of the LFs and LCFs that have been cadmium-electroplated could leach into ground water, which could eventually migrate into the abandoned structure. If the concentration of cadmium from a representative sample of the waste stream meets or exceeds 1 milligram per liter (mg/L) according to the TCLP test, the waste stream would be considered a hazardous waste, subject to RCRA Subtitle C regulations and Missouri Hazardous Waste Management Rules. If the waste in the launchers and LCCs is not a hazardous waste, as determined by the TCLP, or is rendered nonhazardous, the status of these sites would be the same as determined for the lead-based paint (section 4.7.2.2.6).

4.7.2.2.10 Lead-Acid Batteries

The lead-acid weapon system batteries in the LCC and LF would be removed and transported back to the MSB for temporary storage for reuse by the Air Force personnel. If they are not reusable, they would be properly disposed of through DRMO in accordance with all applicable regulations. The contractor would remove the lead-acid batteries that are used as start-up power for the emergency back-up generators (both the ASU and generator batteries) at the LFs and the LCFs. The contractor would be responsible for the proper disposition of the batteries. The potential impact to the health and safety of workers and the general public from the removal of lead-acid batteries is negligible if safety precautions, proper packaging, and proper reuse, recycling, or disposal procedures are carried out. There are long-term benefits of removing these batteries from the deployment area.

4.7.2.2.11 Potassium Hydroxide Batteries

The potassium hydroxide batteries for the missile guidance sets (MGSs) are routinely handled by trained Air Force personnel. The MGS unit would be transported from the deployment area to the MSB for storage at the electronics laboratory by Air Force personnel. At this facility, the battery would be removed and temporarily stored in a cabinet within the MGS vault. The batteries would be reused. If the batteries are no longer used, they would be disposed of in accordance with all applicable regulations. The potential impact to the health and safety of workers and the general public from the removal of potassium hydroxide batteries is negligible if safety precautions, proper packaging, and proper procedures are carried out. There are long-term benefits of removing the potassium hydroxide batteries from the deployment area.

4.7.2.3 Aboveground/Underground Storage Tanks

Except for the deep-buried UST at LCFs which would be closed in place, the USTs containing diesel fuel at the LCFs and LFs and the aboveground storage tank containing gasoline at each LCF would be removed and prepared for storage and disposal by the contractor as part of the dismantlement activities. An investigation would be conducted for potential soil and ground-water contamination before removal of the underground

storage tanks. Proper disposal of both the contaminants and the containers would be conducted by the contractor in accordance with applicable regulations. All USTs could also be abandoned in place by filling them with an inert material in accordance with applicable regulations. If the tanks were not properly abandoned in place, they could eventually deteriorate and potentially cause contamination; removing the tanks would eliminate this potential. Because the deep-buried USTs are thick-walled and would be closed in place according to State requirements, no significant impacts are predicted for leaving these USTs in place. Removing the aboveground and underground storage tanks and performing closure in place of the deep-buried USTs would provide long-term benefits to the environment.

Leaving the deep-buried LCF USTs in place would require the approval of Missouri DNR. Closure of the USTs in place would require removal of product in the tank until a maximum of 0.3 percent of the total volume by weight remains (approximately 44 gallons). Inert fill material would have to be introduced to the tank to disable the system, provide structural support, and provide ballast to keep the tank from rising. Possible fill could include pea gravel, concrete slurry, or sand. Closure according to State guidelines would result in a negligibly greater risk of ground-water contamination than would exist from tank removal, but the amount of product left, the adsorption and/or absorption of the inert fill, and the distance to potable wells (typically more than ¼ mile) would preclude the occurrence of a significant adverse effect (section 4.4.6.5).

4.7.2.4 Solid Waste

Solid wastes would be generated at the LFs and LCFs during the deactivation process, and the current amount of solid waste generated by the deployed sites would be substantially increased during the deactivation process. Solid wastes include construction debris, non-hazardous trash, such as bulky wastes, soil, rock, liquids or sludges, slurries, and recoverable trash and garbage. The increase in solid waste primarily would be debris generated during the construction activities. Most of this solid waste would remain on site and be used as fill. Even though there would be a slight increase in the generation of solid waste from the LFs and LCFs and base activities for disposal at Johnson County landfill, the landfill should be able to handle the additional quantity, assuming that the 80-acre landfill addition is approved. Consequently, no significant impacts from solid waste disposal are anticipated. Specific salvageable items may be removed at the option of the dismantlement contractor. All the deactivation activities, including filling the launch tube, capping the launch tube, grading the site area, and providing positive drainage on the site would be performed in accordance with RCRA, Subtitle D, and the Missouri Solid Waste Rules (10 CSR 80, Chapters 1-7).

4.7.3 Potential Impacts of Continued Operation (No Action)

No significant impacts to public health are anticipated. If operations of the MM II missile system were continued, hazardous materials would continue to be used and hazardous wastes would continue to be generated at the LFs and LCFs. The USTs

would have to be upgraded before the December 22, 1998, deadline (the USTs would be required to have spill/overfill and cathodic protection). The risk of accidental detonation or accidental ignition of a rocket motor are remote but remain possibilities under this alternative.

4.7.4 Potential Impacts of Partial Deactivation

No significant impacts to public health are anticipated. With partial deactivation of the MM II missile system, one or two MSs would remain operational. The risks associated with continued operation of the system remain and the exposure to workers during deactivation of part of the 351 MW would be the same as those discussed for the proposed action. The USTs in the squadrons not deactivated would have to be upgraded before the December 22, 1998, deadline. Long-term benefits would be associated with removing hazardous materials from the deactivated part of the deployment area.

4.7.5 Potential Impacts of Missile Removal and System Shutdown

No significant impacts are anticipated. This alternative would involve the removal of some, but not all, of the hazardous materials at the LFs and LCFs. The sites would have classified and save items removed, including some equipment that would contain hazardous materials. Some PCB filters would remain to allow power to the sites. Because the USTs would be removed before the 1998 upgrade deadline, they would not have to be modified, and no adverse impacts would be anticipated. The potential environmental impacts after the system is shut down would probably be slightly greater for this alternative than for the continued operation alternative because the sites would not be maintained at their current level of readiness; the sites would slowly degrade. Because the launchers would remain intact for potential reuse, they would not qualify as RCRA sites because they were are not "waste" sites. The long-term potential impacts to human health would likely be greater than the other action alternatives, but would likely still be insignificant.

4.7.6 Potential Impacts of the Implementation Alternatives

4.7.6.1 Non-Demolition of LF Headworks

Because the launcher headworks would not be explosively demolished, hazardous materials would not be dispersed as an air plume. Consequently, the short- and long-term effects on human health would be insignificant, and slightly less than those projected for the proposed action.

4.7.6.2 Mechanical Demolition of the LF Headworks

Except for a significant increase in the number of accidents when compared to the use of explosive demolition, no significantly adverse impacts are projected. Under this implementation alternative, the accessibility of a crane to the headworks would be

difficult because of the need to maintain an excavated slope to allow the rubble to be pushed into the launch tube. The labor hours and, consequently, the number of accidents (assuming a constant accident rate), involved in mechanical demolition would also be substantially more than for explosive demolition.

This implementation alternative would release less lead into the air than under the proposed action. The treatment of other health and safety considerations discussed in section 4.7 would be identical to that under the proposed action, with the same impacts.

4.7.6.3 HICS Removal

No significant impacts are projected. The removal of the HICS is an additional activity under this implementation alternative. The HICS contains thousands of miles of copper wire. If excavated, the copper wire in the HICS could be recovered, or it could be disposed of in a solid waste landfill. Disposal of more than 1,700 miles of cable (approximately 20,000 yd^3) in 1 year in the Johnson County Landfill would represent more than 10 percent of the yearly amount of waste deposited in the landfill. Because the cable occurs throughout the deployment area, it would likely be disposed of in different county landfills, and the disposal would occur over several years. Although the cable's disposal would adversely diminish the lifespan of the landfills, no significant impacts regarding solid waste disposal are anticipated.

4.7.6.4 Delay of Deactivation for One Year

The impacts of delaying the deactivation by 1 year would be insignificant and identical to those projected for the proposed action, but would not begin until fiscal year 1993. The proposed 3-year schedule for the deactivation would allow removal of the USTs before the 1998 deadline for UST required upgrading. The impacts associated with current operations would occur until the deactivation begins.

4.7.6.5 Removal of Deep-Buried LCF USTs

No significant impacts to human health and safety would occur if the deep-buried USTs would be removed. Excavating the deep tanks would require the use of engineering structures to prevent subsidence of the excavation, and potential accidents, during tank removal. The risk of contamination from the deep-buried USTs would be slightly less, but negligibly different, than if the tanks were closed in place.

4.7.7 Mitigation Measures

Because of the low likelihood of accidents affecting human health and safety, no additional mitigation measures are proposed beyond the already stringent safety precautions used by DoD.

The regulatory framework in this arena provides the guidelines and practices to minimize adverse impacts from hazardous material usage and hazardous waste

generation, disposal, and management. If proper procedures are followed during the removal process, adverse impacts to the environment would be negligible and the overall effect would be positive. All procedures would be in compliance with regulations to ensure that potential impacts remain insignificant. Mitigation measures for the Air Force and the deactivation contractor to prepare for response to contamination caused or discovered during the deactivation include the following:

- Maintain an updated spill response plan.

- If contamination from a leak is detected, notify the proper authorities and ensure that the contamination does not spread.

It is possible, though not likely, that the LFs and LCFs could be RCRA, Subtitle C sites. To avoid the costly and time-consuming effort to permit and monitor RCRA facilities, it is suggested that the Air Force contractor in charge of the deactivation perform the following mitigation measure:

- Treat or remove lead-based paint and cadmium electroplating from the LFs and LCFs by sandblasting or other appropriate technique. The sand, lead-based paint, and electroplating would have to be removed, suitably packaged as a hazardous waste, and disposed of at a facility permitted to receive hazardous waste.

4.7.8 Unavoidable Impacts

To excavate and remove the USTs, the ground must be disturbed; the soil profile would be temporarily altered.

The increased short-term generation of solid waste as part of the deactivation activity is an unavoidable impact.

Under the proposed action, there are no plans to treat the soil to reverse the soil sterilant effects because the LF area, once deactivated, would be left as a hardstand, and vegetative growth is undesirable at hardstands.

4.8 NOISE

Certain activities associated with the proposed action or alternative could influence the noise environment. Impacts on the environment would be related to the magnitude of noise caused primarily from the LF headworks demolition (blast noise) and vehicle and equipment noise associated with deactivation of the MM II system. Blast noise could slightly annoy a few nearby residents, could rattle windows and walls slightly, and could momentarily startle wildlife and domestic animals. Noise-sensitive receptors, such as churches, hospitals, and animals, could be adversely affected by the blasting and traffic noises.

The basis of determining the significance of the impacts to the biological and human environment is primarily the difference between the baseline noise environment and that of the construction traffic and demolition. An appreciable increase in the background noise level (approximately 30 to 50 L_{dn} range) would be perceived as an annoyance impact. Increases in noise that exceed ambient noise levels by more than 5 dBA would be clearly noticeable and represent an adverse impact.

4.8.1 Analysis Methods

The analysis was based on the review of a number of sources: explosive demolition data, specifications, and publications; transportation and noise data; and maps of the deployment area. Noise effects were evaluated as guided by the C-E-Q network. The review focused on the proximity of dwellings to the LFs (appendix F provides distances to structures); the amount of airblast a window can sustain; the current and projected noise levels from explosive demolition, ground traffic, and air traffic; and the local meteorological data. The difference in noise levels was analyzed to determine whether a significant annoyance impact would occur. Possible impacts to windows from explosive demolition were assessed.

Noise naturally dissipates as it travels through the air in a process known as atmospheric attenuation. Additional attenuation occurs based on the ground surface, foliage, hills, and humidity in the area. However, only atmospheric attenuation is considered for the analysis of potential noise impacts of explosive demolition.

Beyond a distance of one wavelength from the noise source, sound pressure levels attenuate in a linear fashion according to the inverse square law. For each doubling of distance from the source, the noise level can be expected to decrease by roughly six dB (U.S. Army, 1988). This method for calculating noise attenuation tends to overestimate noise levels; thus, the analysis of potential noise levels at various distances from the source during explosive demolition is conservative.

4.8.2 Potential Impacts of the Proposed Action

Noise impacts to humans, other animals, and structures, are not projected to be significant. The noise levels generated by the transporter-erectors (TEs), reentry vehicle

guidance and control (RV/G&C) vans, and other Air Force vehicles involved in the LF deactivation process would be comparable to the existing noise of normal missile movement operations, as described in section 3.8. Recently, vehicles from Whitman AFB were involved in transporting four to eight rocket boosters and other missile components per month. Current missile movements are related to failure replacements of approximately one missile per month. In the short term, the amount of Air Force vehicle traffic would be less than the recent baseline level because a replacement missile would not be going to the LF. However, the increase in construction vehicle traffic would offset the decrease in Air Force vehicle movements in the short term. Compared to the current baseline, noise levels from traffic in the deployment area would increase, but only negligibly. By removing all RVs and MGSs from a missile squadron before any boosters are removed, there would be a short-term (approximately one month) negligible increase in noise levels in the squadron area. After deactivation, traffic noise associated with the prior LF and LCF sites would cease, producing a net long-term reduction in noise.

The main mode of transport for the rocket boosters from Whitman AFB to Hill AFB is by air. MGSs and RVs would also likely be shipped from Whiteman AFB by air. MGSs would be shipped in C-141s or C-130s, while RVs would be shipped in C-141s. Only one booster (composed of three rocket motors) can be transported per plane. The number of MGSs per shipment would range from seven to nine, depending on the space available and type of aircraft used. To assess a conservative scenario without compromising classified information, only one RV is assumed to be shipped per flight. Rocket motors are projected to be removed from the deployment area and shipped to Hill AFB at a rate of one per week for 3 years, totaling 150 flights. A C-141 aircraft that is certified to carry MM II rocket motors would fly into Whitman AFB to pick up the booster and fly out the same day. The number of C-141 flights over the deactivation period for RV transport would be similar. A maximum of 30 C-130 flights over the deactivation period would occur for MGS transport. Assuming this flight activity is divided evenly over the period of deactivation, this level of C-141 and/or C-130 aircraft activity would be similar to what occurred in previous years at Whiteman AFB, excluding 1990 when the runway was inoperable. Thus, these flights would not significantly affect the Air Installation Compatible Use Zone (AICUZ) noise contours.

Deactivation of the LFs would involve demolishing the headworks. The demolition contractor would use explosives to break up the concrete and separate it from steel, which then could be salvaged. Each demolition would be designed to implode steel and concrete from the headworks into the launch tube. The contractor would use the minimum amount of explosives necessary to perform the job. Only one major explosive demolition event would occur for each LF. Construction equipment would be involved with dismantlement activities at the LFs and LCFs, and the magnitude of equipment noise would be comparable to that of the Air Force equipment routinely used for missile removal and replacement. The impacts from traffic noise and construction equipment would be negligible.

The Air Force would contract for explosively demolishing the LFs and LCFs under the following specifications:

- Blasting would be supervised and performed by qualified individuals experienced in demolition blasting.

- Blast-induced ground vibrations would not exceed a peak ground particle velocity of 0.75 inch per second at frequencies less than 40 hertz (Hz) nor 2.0 inches per second at frequencies of 40 Hz or greater.

- The maximum airblast sound level would not exceed 134 dB at a distance of 500 feet (this proved to be achievable during the dismantling of Titan II launchers).

- Flying debris from blasting would not travel beyond the facility site fenced area.

- Ground vibration and airblast noise would be monitored for every explosion.

- At the first demolition site, the contractor would demonstrate the ability to perform in compliance with the above specifications and would follow the procedures found to be effective and in compliance at future sites, unless the Air Force issued written approval for deviations from those procedures.

Demolition explosions in the deployment area would produce both ground-borne vibration (seismic or ground waves) and air-propagated noise (airblast). Seismic waves would propagate more efficiently from those LFs that contact bedrock. All the LFs except A-11 and B-11 contact bedrock. Ground vibration can shake houses or other structures. However, ground wave motions that have a peak particle velocity less than 2 inches per second have a low probability of causing damage (Bollinger, 1971; quoting Duvall and Fogelson, 1962). Air-propagated noise typically arrives slightly later than ground-borne vibration and can produce overpressures that may be perceived as thunder. Ground vibration and airblast can act together to cause windows to rattle and walls and other structural elements to shake. Breakage of windows, however, is rarely observed with overpressures less than 0.1 pound per square inch (150 dB).

The actual noise impacts that would be anticipated during demolition of the MM II LFs would vary with the area's topography. In general, the rolling topography of the landscape in the area where the LFs are located would attenuate the airblast impacts somewhat. Likely impacts include shaking of houses, rattling of windows, and possibly annoying residents. The extent of such impacts depends on the quantity of explosives required for demolition and the distance from the demolition activity to the affected properties.

Factors affecting the distance and intensity of the airblast include air temperature, humidity, windspeed, and direction. Sound focusing could occur under certain inversions, resulting in unusual effects (e.g., a louder noise may be heard 2 miles from the source than at 1 mile). Elmwood, Hughesville, Virgil City, Rockville, Adrian, and Higgensville are within ½ mile of an LF. The town boundaries of Blackburn (1,200 feet south of LF A-11) and Syracuse (700 feet north of LF D-11) are in close proximity to launch facilities. Four potentially occupied structures are 400 to 600 feet from D-11. Assuming a 6-dB decrease in noise per doubling of distance (U.S. Army, 1988), the noise level at the southern edge of Syracuse and northern edge of Blackburn could reach 131 and 127 dB respectively. For those potentially occupied facilities closer to D-11 than the town of Syracuse or for receptors that might be affected by sound focusing during inversions, sound levels would not exceed 135 dB. These levels are projected to be less than those that typically damage windows. Consequently, no significant adverse impacts to residences or facilities are anticipated from the explosive demolition events.

The magnitude of the blast would be sufficiently loud to have a startle effect on nearby residents (impacts on wildlife and domestic animals are discussed in section 4.5) and would be significantly higher than background noise. The blast shocks, exhibiting a maximum peak noise level of 135 dB at 400 feet for less than a few seconds, are only a momentary adverse local impact. A small number of residents would be near enough to be startled or annoyed by any particular blast. As stated in section 4.5, the magnitude of the blast would be sufficiently loud to startle nearby animals close to the LF being demolished. However, any disturbance to animals would be short term and would not cause habitat abandonment or decreased reproduction. Only one blast is anticipated at each LF, and the 4 or more miles between LFs means that few residents or animals, if any, would ever be annoyed twice. The intermittent noise associated with blasting would not significantly increase average ambient noise levels. In summary, the noise generated would not affect human hearing or physiological well-being, and impacts would be limited to a momentary startle effect.

4.8.3 Potential Impacts of Continued Operation (No Action)

The current noise impacts are not significantly adverse, and no new noise impacts would occur. Continued operation of the MM II system would not change the present noise environment. Normal missile removal and replacement, maintenance, and other activities would continue.

4.8.4 Potential Impacts of Partial Deactivation

Under this alternative, noise impacts would be insignificant and similar to those described for the proposed action. However, these impacts would occur in a smaller area because only one or two squadrons would be deactivated. After deactivation is complete for these areas, there would likely be a long-term decrease in noise as Air Force traffic decreases. For areas around MSs that are not deactivated, impacts would be similar to those described under the no action alternative.

4.8.5 Potential Impacts of Missile Removal and System Shutdown

Under this alternative, short-term impacts would be insignificant and less than full or partial deactivation because the potential impacts from explosive demolition would not occur. Noise generated from Air Force traffic would likely remain close to current levels as missiles are removed, classified and save-list items are removed, and the sites are shut down. Long-term impacts would be insignificant.

4.8.6 Potential Impacts of the Implementation Alternatives

4.8.6.1 Non-Demolition of LF Headworks

The noise impacts from implementing this option would be slightly greater, but insignificant, than those of the missile removal and system deactivation option. Compared to the proposed action, there would be fewer vehicles (section 4.9.6.1), the launcher headworks would not be explosively demolished. Long-term impacts would not differ significantly from other alternatives.

4.8.6.2 Mechanical Demolition of LF Headworks

The noise impacts from traffic and construction equipment, except for the mechanical demolition process, would be negligible. No significant impacts are projected.

The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would occur over a longer period of time and cause more noise than that created by the explosive demolition event and the associated equipment. A jackhammer typically emits a peak sound level of 108 dB at its source. At a distance of 50 feet, the sound level would be approximately 90 dB. On a day with normal attenuation, the noise level would decrease below 70 dB near the boundary of the nearest town (Syracuse). A 70-dB noise level is approximately equivalent to traffic at 100 feet (USAF, 1987). The construction noise would not be as loud as that for explosive demolition but would continue during working hours for 1 week or more. The increase in noise levels within the deployment area would be adverse, but insignificant.

4.8.6.3 HICS Removal

Any noticeable ambient noise level increase in a area would be short term and insignificant. Removal of the HICS would require the use of a backhoe, crane, dump truck, and flatbed truck. This equipment would cause noise emissions in addition to those generated by the construction equipment at the LF and LCF sites. Noise generated from HICS removal would occur in the deployment area throughout the deactivation period, but the noise source would be moving along the length of the cable and not originate from any one point for an extended period of time.

4.8.6.4 Delay of Deactivation for One Year

Under this implementation option, the noise impacts would be similar to those described under the proposed action, but would begin 1 year later.

4.8.6.5 Removal of Deep-Buried LCF USTs

Short-term noise levels would be greater but still insignificant under this alternative as opposed to the proposed action because there would be more vehicles and more construction equipment. The long-term noise impacts would be identical to those of the proposed action.

4.8.7 Mitigation Measures

The following are some of the steps that can be taken to avoid or mitigate potential adverse effects of blast noise and vibration:

- Use public announcements, post signs, sound a horn, or even call nearby residents to indicate when explosions would occur, thereby substantially reducing annoyance resulting from startle reactions.

- If houses or structures are located close to demolition sites, modify the contractor's demolition techniques to include millisecond delays that reduce the intensity of airblast and ground vibration.

- Ensure timely repair of any windows or other items inadvertently damaged by a demolition blast.

- Restrict explosive demolition during atmospheric inversion episodes or when high winds are blowing toward a town or sensitive area.

4.8.8 Unavoidable Impacts

Increased noise from the explosive or mechanical demolition of the LF is an unavoidable impact. The noise from construction equipment, vehicles, ground vibration, and airblast would result in unavoidable, negligible impacts on noise. In addition, these impacts would be short term and are considered mitigable, as discussed in section 4.8.7.

4.9 TRANSPORTATION

The transportation network at the MSB and within the deployment area could be adversely affected by the proposed action. Damage or deterioration of roads, annoyance of drivers with additional traffic, and increased risk of traffic accidents are some of the impacts that could occur. Impacts to the transportation system would be significant if the level of service (LOS) were reduced below level B, if major repairs to the roads became necessary because of activities associated with the proposed action, or if the accident rate increased by more than 2 percent. Insignificant impacts would occur if the LOS remained at B or A levels, the accident rate varied by less than 2 percent, or the roads needed only minor repairs. Beneficial impacts would include an improvement in the LOS from B to A or a decrease in the accident rate by 2 percent or more.

4.9.1 Analysis Methods

The analysis is primarily concerned with assessing changes from existing road conditions, traffic safety, and traffic volume as a result of implementing the proposed action. The C-E-Q network was used to focus the analysis of potential impacts to the transportation network. Information provided by Whiteman AFB and by the Missouri Highway and Transportation Department on the traffic routes, type of vehicles, frequency of trips, and road improvement programs were examined and compared to baseline conditions to determine whether a significant adverse affect would likely occur under each of the alternatives analyzed. Appendix F includes the proximity of highways to each LF and LCF.

The traffic volume at the base would remain constant under the continued operation of the MM II system, but would decrease over the long term as a result of implementation of the proposed action; temporary increases in traffic volume would be expected when deactivation begins. Under any deactivation alternative, missiles would rarely be moved from the MSB to the deployment area. The number of trips by base personnel would decrease during the short term and would cease over the long term. Only minor traffic would likely occur to and from the on-base LF trainer (T-12) and the proposed museum at Oscar-1 (the on-base LCF). Consequently, the short- and long-term impacts of deactivation are beneficial for the transportation system at the MSB and are not discussed further.

4.9.2 Potential Impacts of the Proposed Action (Full Deactivation)

No significant impacts to the transportation network, either on the base or within the deployment area are projected. No significant increase in the accident rate, decrease in the level of service, or decrease in road quality would occur.

A typical maintenance schedule involves removing between four and eight missiles and transporting them from LFs to the MSB for servicing each month. Since Rivet MILE was canceled for Whiteman AFB, only failure movements are occurring at a rate of approximately one missile movement per month. Section 3.9 discusses what is involved

in a missile movement. Under the proposed action, only one missile movement would normally occur per LF, for a total of 150 movements. The flights or squadrons that are still operational during the deactivation process may have an occasional missile removed for maintenance.

The Air Force is considering two possible methods of removing the missiles. The first involves removing all RVs and MGSs from a missile squadron before any boosters are removed. The second method involves pulling the RV, MGS, and booster from a site at once, and then moving on to the next site. In either case, approximately 50 LFs would be demolished each year for approximately 3 years. The reduction in missile transporting traffic would be offset by an increase in contractor vehicle traffic; i.e., cranes, dump trucks, heavy equipment, and workers' vehicles. The initial phase of dismantlement would require a crane, a large backhoe, and two or three trucks for hauling steel. Approximately 20 to 30 contractor personnel, most of whom are likely to live in larger communities, including Warrensburg and Sedalia, would be commuting to an LF for approximately 1 month. It is possible that up to three LFs may be deactivated simultaneously or in an overlapping sequence (the rate depends upon the weather and the contractual agreement between the contractor and the Air Force).

Under the proposed action, contractor vehicle trips would average about 30 round trips (or 60 one-way trips) per day to each deactivation site. This would result in an average increase of approximately 4 percent of daily traffic on U.S. highways, 10 percent on State highways, and 40 percent on county roads. The proportional increases in traffic are based on the assumption that all the construction crew workers would travel from the same location at the same time. It is more likely that workers would travel from multiple dispersed sites and would travel at different times.

After a potential 90-day verification period specified in the Strategic Arms Reduction Treaty, workers would arrive at the site to fill in the demolished LF and close the site. Equipment required for this phase would typically include concrete trucks for pouring the concrete cap over the former launch tube, a truck for hauling rebar for the concrete, bulldozers to move the earth, and dump trucks to haul in fill, as necessary. For the proposed action, approximately 35 to 40 truckloads of fill would be required per LF. Approximately six truckloads of concrete would be needed to make a concrete cap over the demolished launch tube at each LF. Earthmoving equipment would also be used to excavate fill at the borrow sites.

The contractor vehicles would be lighter and smaller than missile transporting equipment; therefore, the stress on the road would be less. Although the missile movement traffic would decrease and eventually cease under the proposed action, traffic would increase on deployment area roads from the inception of construction vehicle trips and cause a short-term negligible impact on the LOS. After completion of the proposed action, traffic would be reduced substantially, resulting in a long-term beneficial impact. The most notable decrease in traffic would occur on county roads, where military traffic makes up approximately 40 percent of all traffic. This benefit is partly negated by a potential long-term deterioration of road conditions caused by a

reduction of Air Force funds currently provided for road maintenance. It is not known whether the counties would be able to provide appropriate road maintenance in the absence of Air Force funds. Because the use of these roads would be substantially reduced subsequent to the deactivation activities, it is unlikely that the quality of the road system would significantly degrade over time.

During explosive demolition, traffic could be temporarily delayed or rerouted. The interruption of traffic would have a temporary and insignificant impact the transportation network.

Because multiple routes could be used to access the sites and because the LOSs on the primary and supplementary roads are low (mostly LOS A with some LOS B), no significant increase in accidents as a result of the proposed action is projected to occur. Over the long term, a decrease in the already negligible accident rate for missile-related vehicles in the deployment area is expected.

4.9.3 Potential Impacts of Continued Operation (No Action)

No significant change from the present LOS, accident rates, and road deterioration would occur under this alternative. Normal maintenance, supply, communications, and security trips to and from the LFs and LCFs would continue, as described in section 3.9. Funds for the upkeeping and improving of routes would continue.

4.9.4 Potential Impacts of Partial Deactivation

No significant impacts to the transportation network would likely occur. Under the partial deactivation alternative, only one or two missile squadrons would be deactivated, and the remaining squadron(s) would continue to be operated and maintained. It is likely that traffic would increase in the area of a squadron undergoing deactivation as contractors travel to and from LFs and LCFs, and Air Force traffic occurs in the portion of the squadron that is still operational. After the deactivation process is complete for a particular squadron, traffic volumes to and from these areas would decrease as military and construction-related traffic ceases. The overall funding for road maintenance would decrease on a yearly basis, especially in areas where a missile squadron has been deactivated. The accident rate would likely change negligibly over the short term and decrease over the long term.

4.9.5 Potential Impacts of Missile Removal and System Shutdown

The short-term impacts on the transportation system would be insignificant and would be less than those predicted for the proposed action. Long-term transportation impacts would likely be insignificant, but greater than the other alternatives because of the requirement to maintain the facilities. Under this alternative, Air Force vehicles would be involved in the removal and transportation of missile components, classified and save-list items, and hazardous materials and wastes. Construction vehicles, except for the crane, concrete, and rebar trucks necessary to perform activities under the

proposed action, would also travel to and from the LFs and LCFs. The potential for traffic-related accidents would likely remain low. Funding for maintaining deployment area roads would likely continue, although the level of funding would likely decrease.

4.9.6 Potential Impacts of the Implementation Alternatives

4.9.6.1 Non-Demolition of the LF Headworks

No significant impacts involving the transportation network are projected to occur. Under this alternative, the amount of traffic would be similar to that projected for the system shutdown and removal alternative and less than that required to implement the proposed action. Short-term adverse impacts to the LOS and accident rate would be negligible, with the long-term benefit of no further operations in the deployment area. Impacts from the short-term decrease and long-term cessation of funding of road maintenance and improvement projects would be similar to those projected under the proposed action.

4.9.6.2 Mechanical Demolition of the LF Headworks

Although more vehicles (construction equipment as well as personal vehicles) would be traveling to and from the sites, the accident rate, road conditions, and level of service would not be expected to be significantly affected. The use of equipment for mechanical demolition of the headworks (jackhammers, crane, and backhoe with chisel) would extend the demolition process over a longer period of time. Approximately the same quantity of material would have to be hauled to and from the site, using the same number of vehicles. However, more construction employees would be required for mechanical demolition as opposed to explosive demolition because of the nature of the equipment used.

4.9.6.3 HICS Removal

Significant impacts to the transportation network from removing the HICS are possible. Removal of the hardened intersite cable system (HICS) would require the use of a backhoe, crane, dump truck, and flatbed truck. This process would increase the number of vehicles on primary and supplementary roads traveling to areas where the HICS are buried. The increased traffic could adversely, but not significantly, affect the transportation network to, within, and from the deployment area.

The removal of the HICS may involve the temporary excavation of roads throughout the deployment area. It is likely that the cable beneath the roads could be cut and left in place. If the cable is left beneath roads, then the transportation network would be negligibly affected. If the cable were removed, only a few sections of road would likely be excavated at any one time and traffic would be affected on the excavated road and adjacent roads because of construction detours. The LOS would decrease and the rerouting of traffic would likely increase commuting time. In this situation, the transportation network would be significantly adversely affected.

4.9.6.4 Delay of Deactivation for One Year

The likely potential impacts on transportation would be insignificant and would be the same both in the short term and long term as those of the proposed action, as discussed in 4.9.2, but would begin 1 year later.

4.9.6.5 Removing Deep-Buried LCF USTs

Under this alternative, the potential transportation impacts would be insignificant and negligibly greater than those of the proposed action. The deep-buried LCF USTs would be excavated, and more construction vehicles would be required during deactivation activities at the LCFs.

4.9.7 Mitigation Measures

Potential impacts can be avoided or minimized by the Air Force contractor using the following mitigation measures:

- The Missouri Highway and Transportation Department requires contractors for blasting operations to notify the District Maintenance and Traffic Division in which the blasting would occur. The District would either issue a permit for traffic restriction (the same situation would apply if the HICS beneath roads are removed), or make the contractors aware of other projects in the area that might interfere with the blasting operation so that the contractors could restrict traffic at their discretion.

- Establish flexible work schedules to reduce peak-hour traffic flows.

4.9.8 Unavoidable Impacts

The increase in traffic predicted for all alternatives except the continuation of current operations would have an unavoidable impact. This traffic increase would likely have a short term insignificant impact, as described in section 4.9.2.

4.10 SOCIOECONOMICS

The socioeconomic environment would be affected by deactivation of the 351 MW and the ensuing personnel reductions. The resulting changes in local employment, population, housing demand, public services, and land use were evaluated to determine the significance of impacts. Impacts to the socioeconomic environment are intrinsically related to those on the natural and physical environments and must be assessed in an EIS according to CFR Part 1508.14. Significance criteria were determined based on historic patterns of population and employment change in the Region of Influence (ROI). The ROI is predominantly rural, with low population densities, and has experienced generally slow population growth over the past few decades. There has been no rapid population growth to burden local services. For this reason, population declines are seen as adverse impacts, while population increases would be beneficial.

For resources other than land use, a significant adverse impact is a decrease of more than 2 percent annually from the projected level of the socioeconomic characteristic. In the short term, a decline of this magnitude could weaken local labor and housing markets as well as local services. In the long term, it could change a community's existing structure and organization. An insignificant impact represents an annual change of less than 2 percent from the projected level of the socioeconomic characteristic. This change would not be noticeable in housing demand, school enrollment, public service demands, or local government revenues or expenditures. Beneficial impacts were identified without regard to a specific level. A beneficial impact results from increased growth that strengthens employment opportunities and the local tax base without stressing community infrastructure and fiscal resources.

For land use, an insignificant impact is degradation or improvement of land that has no measurable effect on its current or proposed use. An adverse impact results in degradation of land so that it could no longer be used for its current or proposed use. A beneficial impact noticeably improves land use, with an increase in crop yields, property values, or other economic measures.

4.10.1 Analysis Methods

Measures used for impact analysis include population, employment, housing, residence, and commercial data, school enrollments, and Air Force rural electricity consumption. The selection of these resources was based in part on the cause-effects-questions networks developed for this analysis. Employment data are originally from the U.S. Bureau of the Census and the U.S. Bureau of Economic Analysis and were obtained from the Economic Impact Forecast System (EIFS) of the Environmental Technical Information System (ETIS), operated by the U.S. Army Corps of Engineers Construction Engineering Research Laboratory (USACERL). Multipliers, diversification indices, and rational threshold values computed by EIFS models were used to determine historic patterns and estimate employment impacts. Population data are from the U.S. Bureau of the Census and the Missouri State Data Center. Compound growth rates for population and employment were calculated using spreadsheet analysis. Housing information is from

the U.S. Bureau of Census and the Family Housing Market Analysis by Robert Niehaus (Niehaus, 1990). School enrollment information is from the Knob Noster, Warrensburg, Sedalia, Windsor, and La Monte School Districts. Electricity consumption data are from Whiteman AFB and the electric companies and cooperatives serving the LFs and LCFs. The latest available data were used for all variables. Local government and school officials and business leaders were contacted, and past documents about socioeconomic impacts at Whiteman AFB were reviewed.

This analysis was based solely upon the action under study (the MM II deactivation) and did not consider any other potential actions that could occur at Whiteman AFB or in the surrounding communities. Chapter 5 evaluates the cumulative impacts of the MM II action and other reasonably foreseeable actions. The analysis of cumulative impacts is especially important because of the potential offsetting effect of other projects proposed for Whiteman AFB.

Analysis of potential impacts is based on a 3-year deactivation schedule. If this schedule were extended over a longer period, the potential impacts in the final years could be reduced slightly, because spreading impacts over a longer timeframe generally reduces their severity. However, the greatest impact would still occur in the final year of the deactivation.

The loss of 1,648 authorized positions from implementing the proposed action was assumed to result in a loss of an equivalent number of personnel. This conservative assumption disregards the fact that some authorized positions are unfilled. It was also conservatively assumed that all 1,648 personnel would leave the Whiteman AFB area. As discussed in section 2.2.6, there are three possible options for the 1,648 personnel, and under a separation or retirement program, personnel could remain in the ROI. The proportion of personnel in the three option categories is unknown. However, it is likely that the dominant proportion of the affected personnel would transfer or choose to return to their home of record. Consequently, the assessment of the departure of all 1,648 personnel and their families provides a conservative approach for analyzing socioeconomic impacts.

4.10.2 Potential Impacts of the Proposed Action (Full Deactivation)

The personnel changes projected to occur at Whiteman AFB, assuming a 3-year deactivation period, are summarized in table 4.10.2-1. The force reduction of 1,648 personnel would include less than 1 percent civilian civil service employees, 17 percent officers, and 82 percent enlisted personnel. By 1996, the mix of the 1,700 personnel remaining at the base after deactivation would have a higher concentration of civilians than at present (21 percent versus 11 percent).

Table 4.10.2-1 Personnel Reductions Because of Proposed Deactivation, With Projected Base Employment Following Deactivation						
Category	1992 Base Employment	Base Personnel Reductions				Projected 1996 Base Employment After Deactivation
		FY93	FY94	FY95	Total	
Enlisted	2,836	194	406	754	1,354	1,482
Officers	471	61	84	135	280	191
Total Military	**3,307**	**255**	**490**	**889**	**1,634**	**1,673**
Civilian	403	0	2	12	14	389
TOTAL	**3,710**	**255**	**492**	**901**	**1,648**	**2,062**
Source: HQ SAC/XPM, 1992.						

4.10.2.1 Population

A decrease in population would occur, causing a significantly adverse impact in certain local areas. The impacts of a force reduction and departure of 1,648 Whiteman AFB personnel would result in an estimated population decline of 3,625 people. As shown in table 4.10.2.1-1, approximately 97 percent (or 3,500 individuals) of this population loss is expected to occur within the three-county primary area over a 3-year period. More than 50 percent of this reduction is expected to occur in the third year of the deactivation.

The population loss among individual counties in the primary area is estimated to occur in direct proportion to current percentages of off-base military personnel in residence.

Johnson County is expected to experience a loss of 2,900 people; this is significantly adverse because it would represent a decline of 6.7 percent below the population forecasted for the county, assuming no deactivation. The population loss in Johnson County would be considered a significant, adverse impact. Population declines in Pettis and Henry Counties would be less than 1.3 percent, an insignificant impact.

The proposed deactivation involves construction activities for LCFs and LFs. These activities are performed by small crews (20 to 30 persons) moving from site to site over a 3-year period. Based on previous missile deactivations, impacts on area population from these construction crews are expected to be short term.

Table 4.10.2.1-1 Population Impacts of the Proposed Action on Primary Region of Influence				
Area of Impact	1993	1994	1995	Total
Military and Civilian Job Loss per Year	255	492	901	1648
Population Loss per Year	561	1,082	1,982	3,625
Johnson County (80.8%)[a]				
Population W/out Deactivation	43,554	43,472	44,823	
Population With Deactivation	43,100	42,143	41,892	
Cumulative Population Loss	454	1,329	2,931	2,931
Percent Decrease	1.0%	3.0%	6.7%	
Pettis County (12.2%)[a]				
Population W/out Deactivation	35,151	34,991	34,875	
Population With Deactivation	35,083	34,790	34,453	
Cumulative Population Loss	68	200	442	442
Percent Decrease	0.2%	0.6%	1.3%	
Henry County (4.6%)[a]				
Population W/out Deactivation	20,154	20,166	20,202	
Population With Deactivation	20,128	20,090	20,036	
Cumulative Population Loss	26	75	166	166
Percent Decrease	0.1%	0.4%	0.8%	
Total Primary Area Cumulative Population Loss	548	1,604	3,539	3,539

[a] Distribution of off-base military households; 2.4 percent of military households live outside of the three-county primary area.

Source: HQ SAC/XPM, 1992; LAI.

4.10.2.2 Employment

The force reduction impacts on the employment base of the region would be significantly adverse in Johnson County only, in the second and third years of deactivation. However, construction activity at the LFs and LCFs may provide short-term beneficial impacts for the local construction industry.

The loss of 1,648 jobs at Whiteman AFB would have a multiplier effect on other employment in the region because military and Department of Defense (DoD) civilian employment is considered a basic employment industry. A basic industry is defined as an industry that produces goods or services (national defense) that are consumed or

exported outside the region. This industry brings outside money into the economy that supports local service and non-basic businesses. A non-basic industry is generally a service-oriented business that serves other local businesses or the consumer needs of the population in the immediate area, and usually does not earn income or do business outside of its regional location. The ratio of basic to non-basic employment in a given region is the employment multiplier, which indicates the potential increase or decrease in total jobs in the community as a result of changes in basic industry employment. Although employment at Whiteman AFB is considered to be a basic industry, it does not have the full impact on the local non-basic employment sector that would occur with a private basic industry business of a similar employment size, because a significant amount of goods, services, and housing are consumed on the military installation (ORNL, 1987). Therefore, for this analysis, the EIFS (USACERL) multipliers for the three-county primary area were reduced by 50 percent, resulting in a "modified multiplier." The modified multiplier for the primary area is 1.5656, meaning that for each new job in the basic sector, another additional 0.5656 new job will be generated in the non-basic sectors, for a total of 1.5656 new jobs. Conversely, a loss of one job in the basic sector will result in the loss of 0.5 of a job in the non-basic sector.

Table 4.10.2.2-2 shows the total of direct and indirect employment lost from deactivation of the 351 MW. The direct employment loss of 1,648 jobs will only affect the employment base in Johnson County because all the jobs are at Whiteman AFB. The distribution of indirect jobs lost as a result of the deactivation is based on military personnel residence patterns with the assumption that some proportion of the indirect job loss would occur in Pettis and Henry Counties. The direct (1,648) and indirect (932) job loss would total 2,580 over a 3-year period; more than 50 percent of the employment decline would occur in the third year.

Of the three counties in the primary area, Johnson County would experience a significant adverse impact, with a total loss of 2,085 direct and indirect jobs over a 3-year period. In 1995, employment levels in Johnson County would be approximately 9 percent below levels forecast before the announcement of the proposed deactivation.

The forecast job loss over the 3-year drawdown period in Henry County (118) and Pettis County (315) was a decline of less than 2.0 percent below forecasted employment levels. Based on the evaluative criteria for this analysis, Henry and Pettis Counties would be insignificantly affected by the loss of jobs.

The construction activities related to deactivation of the MM II missile system are expected to have a negligible, perhaps slightly beneficial, impact on area employment. Some of the construction workers would be drawn from the local labor market, which has adequate workers to supply this need. A few new secondary jobs may be created to service the construction activity. Local small businesses (grocery stores, gas stations, cafes, etc.) on transportation routes to the LF and LCF sites may experience short-term beneficial impacts from the presence of the construction crews.

Table 4.10.2.2-2 Job Impacts on Primary Region of Influence				
Area of Impact	**1993**	**1994**	**1995**	**Total**
Military and Civilian Job Loss per Year	255	492	901	1,648
Multiplier Impact on Non-Military Employment (Modified multiplier 1.5656)	144	278	510	932
Total Job Loss per Year	399	770	1,411	2,580
Johnson County[a] (80.8%)				
Employment W/out Deactivation	22,861	22,767	22,982	
Employment With Deactivation	22,538	22,821	20,896	
Total Job Loss Cumulative	323	945	2,085	2,085
Percent Decrease	1.4%	4.2%	9.1%	
Pettis County (12.2%)				
Employment W/out Deactivation	21,696	21,820	21,992	
Employment With Deactivation	21,647	21,677	21,677	
Total Job Loss Cumulative	49	143	315	315
Percent Decrease	0.2%	0.6%	1.4%	
Henry County (4.6%)				
Employment W/out Deactivation	10,409	10,458	10,543	
Employment With Deactivation	10,440	10,438	10,425	
Total Job Loss Cumulative	18	54	118	118
Percent Decrease	0.2%	0.5%	1.1%	

[a] Distribution of off-base military households; 2.4 percent of military households live outside of the three-county primary area.

Source: HQ SAC/XPM, 1992; U.S. Bureau of Labor Statistics, 1991; LAI.

4.10.2.3 Housing

The force reduction at Whiteman AFB would have significant adverse impacts to the housing market in Johnson County in the last two years of deactivation. This conclusion is based partly on the assumption that as the drawdown occurs, vacancies in on-base housing would be filled by off-base personnel as soon as feasible. This assumption is substantiated by the fact that the current waiting period is from 6 months to 14 months for all types of on-base housing. Based on FY92 housing data, a total of 1,591 (54 percent) of the military personnel assigned and working at Whiteman AFB lived in off-base housing. The movement of military households into on-base family

housing units would also be influenced by the general policy within the Air Force that encourages maintaining full occupancy of available base housing. It is therefore assumed that at the end of the 3-year drawdown period, the current ratio of 54 percent of military personnel living off base will be reduced significantly. Approximately 90 percent of the remaining 1,700 personnel could live in on-base housing.

As shown in table 4.10.2.3-1, housing vacancy rates during the first year of deactivation would be expected to increase only slightly. During the 1994-95 period, Pettis and Henry Counties would continue to experience only small increases in their housing vacancy rates. However, major impacts would occur in Johnson County, where the deactivation could result in a housing vacancy rate of about 14 percent by 1995. This vacancy rate would be high enough to significantly affect property values in the area. The smaller communities of Knob Noster and La Monte could suffer very significant adverse impacts because of the high concentration of off-base military personnel living in these areas. In particular, Knob Noster has an estimated 70 percent of their housing units occupied by off-base AFB personnel. During the 1994-95 period, vacancy rates could be very high, resulting in declining local property values. La Monte, with about 20 percent of its housing occupied by military, would also be significantly affected by the deactivation.

4.10.2.4 Retail Sales and Service Businesses

The loss of approximately 3,600 military personnel and their families in the three-county primary ROI would have significant adverse impacts on Johnson County retail and service businesses in the second and third years of deactivation.

The anticipated loss of trade area population in each county was developed from off-base residence patterns of military personnel with the assumption that retail sales would decline in the three respective counties in a proportion similar to population declines. Based on this assumption, retail sales and service business could experience a decline of $2.9 million during the first year of deactivation, with Johnson County accounting for about $2.1 million (70 percent) of the decrease in the three-county area (table 4.10.2.4-1).

In the third year of the deactivation, Johnson County could lose $14.6 million, which would represent a 6.6 percent decrease (a significant adverse impact) below the baseline forecast of sales for retail and service businesses.

The retail consumer survey discussed in section 3.10.5 indicated that off-base shoppers had a strong preference for Warrensburg markets; 65 percent of the respondents identified this market as their preferred off-base shopping area. The retail shopping patterns expressed in this survey indicate that Warrensburg retail and service businesses could experience significant impacts to sales, particularly in the third year of the deactivation. Among the smaller communities, business in Knob Noster could also be adversely affected. The high concentration of military people living in Knob Noster would transfer out of the area, creating high housing vacancies and a shrinking market area.

Table 4.10.2.3-1 Housing Impacts in Primary Region of Influence				
Area of Impact	**Distribution of Off-Base Military Households by County**[1]	**1993**	**1994**	**1995**
Military households lost annually from deactivation		255	492	901
Housing Impact				
Johnson County	80.8%			
Number of housing units		15,395	15,395	15,395
Percent vacancy without deactivation		5.3%	5.3%	5.3%
Number of units vacant from deactivation (cumulative)		206	602	1,330
Percent vacancy with deactivation		6.6%	9.2%	13.9%
Pettis County	12.2%			
Number of housing units		14,754	14,754	14,754
Percent vacancy without deactivation		4.7%	4.7%	4.7%
Number of units vacant from deactivation (cumulative)		31	91	200
Percent vacancy with deactivation		4.9%	5.3%	6.1%
Henry County	4.6%			
Number of housing units		8,492	8,492	8,492
Percent vacancy without deactivation		3.6%	3.6%	3.6%
Number of units vacant from deactivation (cumulative)		12	34	75
Percent vacancy with deactivation		3.7%	3.9%	4.4%

[1] 2.4 percent of off-base military households lie outside of the three-county primary area.

Source: U.S. Bureau of the Census, 1990, Census of Population and Housing; LAI.

4.10.2.5 Education

Knob Noster and Warrensburg School Districts are expected to incur significant school enrollment impacts, with total losses of 22 and 17 percent of enrollment, respectively. Federal impact aid losses are expected to be insignificant.

As explained in section 4.10.2.4, this analysis assumes that all on-base family housing vacancies will be filled as soon as feasible, as personnel who now live off base move into

Table 4.10.2.4-1
Retail Sales and Selected Service Receipts Impact on Primary Region of Influence
(Sales are in $000)

Area of Impact	1993	1994	1995
Johnson County			
Sales/Receipts without Deactivation	$207,537	$211,409	$217,752
Sales/Receipts with Deactivation	205,462	204,856	203,162
Percent Decrease	1.0%	3.0%	6.6%
Sales/Receipts Loss	$2,075	$6,554	$14,589
Pettis County			
Sales/Receipts without Deactivation	$331,367	$340,626	$350,845
Sales/Receipts with Deactivation	$330,705	$338,582	$346,284
Percent Decrease	0.2%	0.6%	1.3%
Sales/Receipts Loss	$663	$2,044	$4,561
Henry County			
Sales/Receipts without Deactivation	$151,026	$155,401	$160,063
Sales/Receipts with Deactivation	$150,875	$154,780	$158,783
Percent Decrease	0.1%	0.4%	0.8%
Sales/Receipts Loss	$151	$622	$1,281
Source: HQ SAC/XPM, 1992; Labat-Anderson Incorporated.			

on-base housing. Therefore, all permanent impacts of the deactivation would be experienced in the communities housing off-base Whiteman AFB personnel and by the school districts serving those communities.

Impacts on the two school districts were estimated using the latest available data. Personnel losses for each town were estimated based on residence patterns. For each school district, a ratio was calculated of 1991 military off-base personnel who reside in that district to 1991-92 students who are dependents of off-base personnel; enrollment reductions were estimated using this ratio. Enrollments were projected using 1987-92 growth rates.

This analysis assumes that those personnel whose jobs are eliminated are representative of the total Whiteman AFB population with regard to residence patterns and to the number of school-age dependents in the two school systems. For the purposes of analysis, it is also assumed that all personnel whose jobs are eliminated would leave the area. However, it is likely that some of these personnel would choose to retire and stay in the area. Therefore, the estimated enrollment losses may be slightly overstated.

Negligible impacts to the school systems are expected from the construction activity involved in the deactivation process, because few workers are expected to move families into the area.

4.10.2.5.1 Knob Noster Schools

Enrollment. It is estimated that as a result of the 3-year MM II deactivation, Knob Noster schools could lose as many as 450 students, 22 percent of its projected FY95 enrollment. This would be a significant impact. However, the loss would occur over a 3-year period, with more than one-half of the enrollment loss occurring in the third year of deactivation. Even with the projected declines, Whiteman AFB dependents would constitute more than 60 percent of Knob Noster's total enrollment, but the percentage of Category B students (children of Whiteman AFB's civilian and off-base military employees) would fall below 20 percent in FY94 and FY95, the second and third years of deactivation.

Impact Aid. It is expected that on-base family housing will continue to be occupied at current levels, so no reductions are anticipated in Category A impact aid. However, Category B impact aid may decline substantially for two reasons. First, the number of Category B students could be reduced by as much as 90 percent. Second, the percentage of Category B students could fall below 20 percent of total enrollment in the second and third years of deactivation, thus disallowing the district's "Super B" status and resulting in lower per-pupil payments. Under this scenario, Category B impact aid could fall from its current level of $66,700 (1.1 percent of 1990 total revenues) to less than $2,000 (0.03 percent). Because it is such a small portion of Knob Noster's total revenues, this amount of lost Category B impact aid would be considered an insignificant impact.

4.10.2.5.2 Warrensburg Schools

Enrollment. During the 3-year deactivation period, Warrensburg schools could lose nearly 500 students (17 percent of projected total enrollment in FY95), a significant impact to enrollment even though some currently crowded conditions may be alleviated. More than one-half of the enrollment loss would occur in the third year of deactivation. Whiteman AFB dependents, currently 18 percent of total enrollment, would constitute less than 2 percent of enrollment in FY95.

Impact Aid. The current Federal impact aid of $18,662 is less than 1 percent of Warrensburg's total school revenues. It is expected to decline to less than $2,000 by the third year of deactivation (FY95). Because it is such a small portion of Warrensburg's total revenues, the loss of Category B impact aid is not considered a significant impact.

4.10.2.5.3 Other School Districts

Ninety percent of Whiteman AFB military personnel live within the Knob Noster and Warrensburg School Districts, with the remaining 10 percent dispersed among several

other communities. Because military personnel are concentrated in the two Johnson County communities, impacts on other school systems have not been assessed.

4.10.2.6 Land Use

Long-term land use impacts are expected to be insignificant. The total acreage of land tied up by fee simple purchase (the LFs and LCFs themselves) is about ½ square mile over the entire deployment area. Approximately 75 percent of the land use in the deployment area is for crops and pasture. The farmers have been able to use the easement lands and have crops or grazing on Air Force property immediately outside the installation fences. Adverse, but insignificant short-term impacts to land use would occur in the immediate vicinity of the LCFs and LFs.

Future uses of the LF and LCF sites are undetermined at this time. It is likely that the former LF sites could be reused as hardstand areas for parking vehicles and storing materials. In addition to the aforementioned uses, the former LCF sites could be reused as living facilities.

Most of the LF and LCF sites were purchased from one landowner and could be sold back to the former landowner under certain conditions after the Air Force has completed the deactivation and dismantlement process (see sections 2.2.3 and 2.2.4). Some of the sites were purchased from multiple landowners; disposition of these sites would be more complex. In either case, disposition of these lands may take from 1 to 3 years. Restrictive easements would generally revert back to the former landowners after a period of 1 to 3 years.

Explosive demolition of the headworks could damage structures within the 2,800-foot explosive blast safety zone. Before and during the demolition event, activities within the 2,800-foot zone could be restricted to ensure safety. However, it is anticipated that the restriction periods would be of very short duration and would have no significant impact on the long-term land use of the potentially affected area.

The gates and line-of-sight posts associated with the HICS would be removed only upon the landowner's request. The HICS is buried from 3 to 6 feet below ground, but it is closer to the surface near the markers. If the landowner requests removal of a line-of-sight post, the cable could be excavated for a short distance on either side of the marker post, causing a short-term ground surface disturbance in the immediate vicinity of the marker post. The easements for placing and maintaining the cable specify that the cable shall be maintained at a minimum depth of 36 inches. An issue of potential concern is erosion with exposure of the cable. The reduction in burial depth presents a potential hazard to farmers operating disc equipment with tractors. Very few claims involving the cable have been filed. Most of these claims were filed because of cattle being frightened from helicopter flights to inspect the cable, cattle escaping through access gates left open, or crop damage resulting from crews ingressing or egressing the easement area for purposes of repairing or maintaining the cable (2154 CS/LGPK, 1992).

4.10.2.7 Utilities

It is expected that suppliers of electricity to LFs and LCFs would be insignificantly affected by the proposed action.

Only two electricity suppliers, both small rural electric cooperatives, receive more than 2 percent of their total sales from LF and LCF usage. For these cooperatives, the loss of 2.1 percent of total sales could result in very small rate increases to the other members of the consumer-owned cooperatives, probably no more than a few dollars per year for each consumer. It is expected that these increases would be less than 2 percent per year for each cooperative member, resulting in an insignificant impact.

4.10.2.8 Government Finance and Services

Services in the region of influence could be significantly and adversely affected. The loss of jobs, population, and retail sales resulting from the MM II deactivation would negatively impact tax revenues in the short term, particularly for the cities of Knob Noster and Warrensburg, where most off-base military personnel live. During this short-term readjustment period, government entities may be required to reduce expenditures and the level of community services (fire, police, recreation, and others) to accommodate lower demand and to meet reduced revenue levels. Capital improvement programs may also have to be delayed until after the 1993-95 deactivation period, when the impacts of employment and population declines can be more accurately assessed.

4.10.3 Potential Impacts of Continued Operation (No Action)

No new impacts or significant impacts would occur as a result of the no action alternative. Continued operation of the MM II system would result in the continued socioeconomic impacts of supporting approximately 1,650 employees and their families. Present demand for secondary employment, housing, educational and public services, and utilities would continue. There would be no change in present land use.

4.10.4 Potential Impacts of Partial Deactivation

The partial deactivation of one missile squadron is not be expected to have a significant impact on the three-county primary area. However, a significant economic impact on employment and population is expected to occur in Johnson County if two squadrons were deactivated. Partial deactivation of the three-squadron, 150-missile wing, with a total of 1,648 personnel, would not be linear in terms of personnel reductions. The deactivation of the first squadron of 50 missiles would reduce personnel requirements by 255, while deactivation of a second squadron would result in a reduction of about 500 personnel, for a cumulative reduction over a 2-year period of about 750 people. The deactivation of the third squadron would include all of the wing level support personnel, resulting in a loss of 900 personnel if the final squadron were deactivated (USAF, 1991h).

The deactivation of one squadron would have a relatively insignificant impact on Johnson County, resulting in a total direct and indirect loss of 322 jobs. Insignificant impacts would likely occur in Pettis and Henry Counties.

The potential impacts of partial deactivation of two squadrons are the same as those given in section 4.10.2 for the first 2 fiscal years of deactivation: 1993 and 1994. The primary impact would occur in Johnson County with deactivation of the second squadron, while impacts in Pettis and Henry Counties would be insignificant. The cumulative job loss for deactivating two squadrons would be about 950 jobs (table 4.10.2.2-2). This would result in a Johnson County employment level in 1994 of 22,185, 4.1 percent below the projected Johnson County baseline, a significant impact. Other socioeconomic resources in Johnson County would also be significantly affected to an adverse extent.

4.10.5 Potential Impacts of Missile Removal and System Shutdown

It is possible that significant adverse socioeconomic impacts could occur. The potential socioeconomic impacts resulting from missile removal and system shutdown are anticipated to be less than under total deactivation, as discussed in 4.10.2. The actual manpower requirements for maintaining a system shutdown and maintenance crew have not been estimated by the Air Force.

4.10.6 Potential Impacts of the Implementation Alternatives

4.10.6.1 Non-Demolition of the LF Headworks

The positive employment impacts resulting from demolition activities for the MM II system would be reduced because there is less construction activity associated with leaving the headworks in place. Other socioeconomic impacts would be nearly identical to those estimated for the proposed action.

4.10.6.2 Mechanical Demolition of the LF Headworks

Mechanical demolition would result in an insignificant but beneficial impact on local employment.

The dismantlement of the LFs using mechanical demolition techniques would require more labor, construction equipment, and more time on site than would be required if explosives were used in the demolition process. Mechanical demolition would require more than 1 week of time as compared to 1 or 2 days for demolition with explosives. Mechanical demolition would also require more and larger construction equipment, including jack hammers, backhoes, and possibly a wrecking ball. The decision to use mechanical demolition would provide an opportunity to use more local construction labor and contractors, resulting in an insignificant but beneficial impact to the ROI. Explosive demolition, which is more specialized than mechanical demolition, is usually

conducted by explosive specialty contractors located outside of the local area, therefore resulting in a negligible impact within the ROI.

4.10.6.3 HICS Removal

Complete HICS removal would have insignificant, beneficial impacts on local employment and significantly adverse impacts on land use.

Complete removal of the HICS would require more labor and construction equipment than would be required to remove the cables only in the immediate vicinity of the markers. Complete HICS removal could have an insignificant but beneficial impact on employment in the ROI.

Leaving the HICS below ground (except for excavations as necessary to remove the line-of-sight poles) would be far less injurious to the environment than if the cable were excavated. The presence of the buried cables, with the exception of areas around line-of-sight posts where the cables are closer to the surface, does not usually interfere with present surface land uses.

The potential exists for damages against the government if the cable were to rise in a plowed field (because of frost heave or some other factor) and be caught by a tractor and/or other equipment. After the sites in a squadron have been deactivated and are ready for disposition, the Air Force would terminate the perpetual easement for the HICS through local courts, thereby limiting future claims. Severe damage could be done to the equipment and could cause injury to the operator. Long-term farm use could be disrupted if the cables rise. However, based on the infrequency of past situations where the HICS has been exposed, it is anticipated that insignificant impacts would result from leaving the cable in the ground.

Short-term consequences of excavating the cable would be significantly adverse. The excavation could disrupt other activities, such as plowing. The HICS excavation could not occur during the growing season in areas under cultivation without causing severe short-term and possible long-term economic loss to the landowner.

4.10.6.4 Delay of Deactivation for One Year

Under this implementation alternative, the impacts would be the same as those identified for the proposed action, but with a delay of one year.

4.10.6.5 Removal of Deep-Buried LCF USTs

There is no significant difference to socioeconomic resources whether the USTs are left in place or excavated. This option would reduce the amount of construction expenditures and employment that would be required during the deactivation phase, resulting in a corresponding decrease in beneficial employment impacts in the ROI. The extent of beneficial impact is negligible.

4.10.7 Mitigation Measures

The following potential mitigations to socioeconomic resources are suggested:

- Furnish assistance to local economic development agencies in attracting new industries to provide employment opportunities, especially in Johnson County. The availability of housing that is less expensive than in many areas of the United States could help attract industry to the area.

- Request that the Army Corps of Engineers (COE) initiate a housing study to determine whether homeowners in the Whiteman AFB area would be eligible for the Homeowners Assistance Program (HAP). Administered by COE for DoD, HAP can assist eligible military and civilian personnel in areas where housing values have declined because of a base closure or realignment.

- Notify the local school districts of any incoming personnel scheduling changes that may occur related to the MM II deactivation and the B-2 basing action. This would allow the school districts to plan for enrollment changes with as much notice as possible.

- Provide the electric cooperatives with the deactivation schedule for the individual LFs and LCFs within their service areas. Because the rates paid by cooperatives to their power suppliers are determined by power demand in the previous year, this schedule information would enable the cooperatives to avoid unnecessary rate increases to their members.

4.10.8 Unavoidable Impacts

Over the 3-year deactivation period, unavoidable impacts could occur to employment, housing, retail sales, and schools. More than 900 secondary, service sector jobs could be lost in the ROI, primarily in Johnson County. By 1995, Johnson County could experience a housing vacancy rate of approximately 14 percent, causing declines in property values; these impacts would be concentrated mostly in Knob Noster and La Monte. Johnson County could lose nearly 7 percent of its retail sales by 1995, with impacts predominantly in Knob Noster and Warrensburg. Local schools could experience significant enrollment declines, especially Knob Noster (22 percent) and Warrensburg (17 percent).

CHAPTER 5
CUMULATIVE IMPACTS

5.0 CUMULATIVE IMPACTS

The potential for cumulative impacts—additive or incremental—has been addressed in several contexts: within the project, within the region, and within the timeframe of the recent past and foreseeable near future. Any action at Whiteman AFB could proceed with other recently implemented or presently proposed actions taking place during approximately the same timeframe. To help with the planning of the proposed Minuteman II (MM II) system deactivation and other projects (e.g., basing of a B-2 bomber wing), this study provides information on the cumulative impacts of other programmed operations or plans. The potential for cumulative impacts is discussed in the following sections.

5.1 CUMULATIVE IMPACTS WITHIN THE PROJECT

The proposed action consists primarily of a series of repetitive actions—the dismantling of 150 launch facilities (LFs) and 15 launch control facilities (LCFs). Therefore, impacts at an individual site may have more significant aggregate impacts when considered with the impacts of all the other LF and LCF sites together. Although each site will likely incur the same types of impacts, the magnitude of impacts may vary because of site-specific physical conditions. For some resource areas, such as air quality, the impacts do not effectively accumulate; for others, the following additive effects are likely:

- Water resources: Local adverse effects on ground and surface waters caused by each site dismantlement could cause a cumulatively significant impact on the aquifers and surface waters on a regional basis. Some localized shallow aquifers that extend over several miles could be adversely affected by an explosive demolition event at more than one LF.

- Geological resources: The amount of excavated fill material needed for one LF may have local, insignificant effects, but the amount required for all LF and LCF sites within the project could collectively have significant requirements. As indicated in section 4.3, this provides the potential for significant adverse impacts resulting from the required excavation in the erosion-prone soils of the region. Because the Air Force is planning to require the contractor to use existing borrow pits, the geological and hydrological resources within the deployment area would be insignificantly affected. If new borrow pits or the extension of the existing pits into previously undisturbed areas would be required, there could be some significant localized adverse impacts.

- Transportation resources: More than one LF would be simultaneously undergoing deactivation. The cumulative impacts of using the same roads for more than one site were considered in section 4.9 and were determined to be not significantly adverse because of the different routes

available to reach the worksites and the already low level of traffic on the deployment area roads.

In addition to these aggregations of the same types of impacts, cumulative impacts could also occur from interactions of effects on different resources. The cause-effect-questions (C-E-Q) networks presented in section 4.0 illustrate the interrelationship of impacts on one resource area with another. Two examples are discussed below:

- Fracturing of low-permeability material beneath a surface water body could affect the ground-water table, precluding the retention of surface water and affecting wildlife or stock animals using the reservoir. No such cross-resource interaction effects were identified.

- Extraction of borrow material would affect not only the soil resources, which are highly susceptible to erosion, but also the native prairie vegetation, which would need some time to reestablish. During this time, suitable habitat for wildlife could be decreased.

No situations have been identified that would be insignificant when considered alone, but cumulatively significant when considered with interrelated impacts. Chapter 4 discussed the adverse significance of explosive demolition on shallow aquifers and surface water supplies and described the adverse impacts from the excavation of borrow pits on a number of resource elements.

5.2 REGIONAL CUMULATIVE IMPACTS

Current plans include the basing of the B-2 Advanced Technology Bomber (ATB) with T-38 training aircraft and the realignment of the 442nd Fighter Wing with A/OA-10 aircraft, support units, and personnel from Richards-Gebaur AFB to Whiteman AFB. These are the major actions within the Region of Influence (ROI) that would create environmental impacts that would increase or decrease the significance of the impacts of the MM II system deactivation. A separate environmental impact statement (EIS) is being prepared to assess impacts of basing these aircraft at Whiteman AFB. In addition, the Missouri National Guard plans the continued use of facilities on the base for National Guard helicopters. Future plans may include expanding Guard activities and facilities at Whiteman AFB with the construction of an armory and conducting weekend exercises on the base.

The deployment area is primarily an agricultural area with low industry demand and few large private projects planned for the future. Thus, there is negligible and insignificant demand for an improved transportation network. Transportation improvement projects, as discussed in section 3.9, would occur adjacent to and within the Missile Support Base (MSB) and deployment area. Because the amount of work by dollar volume is fairly constant each year, no excessive conflicting demands for workers that would perform the deactivation activities are projected to occur.

5.2.1 The Biophysical Environment

The potential for impact to the biophysical environment from the B-2, T-38, and A/OA-10 basing action would likely occur in the immediate confines of the base boundaries, while the impacts from the deactivation would primarily occur throughout the deployment area. Therefore, there is little potential for increased or decreased severity of a regional cumulative impact.

Potential cumulative impacts could result within the immediate vicinity of the base if the no action alternative occurs with the basing action. Insignificant impacts identified with the proposed action could become significant from cumulative increases in different mission operations, activities, and number of personnel. Adverse impacts could occur to air resources from increased sources of emissions; to water resources from increased consumption and potential for contamination; to biological and cultural resources from increased activities and disturbance; to health and safety from increased exposure to hazardous materials/waste and from the introduction of flying missions; and to the transportation network and socioeconomic environment from increases in personnel and construction activity. As the analysis of environmental impacts of the basing action progresses, potential significant cumulative impacts can be better identified. A more definitive discussion of environmental impacts to the resources of Whiteman AFB and to the health and safety of personnel and the local public will be presented in the EIS for the basing action.

5.2.2 The Socioeconomic Environment

The socioeconomic environment around Whiteman AFB may be affected by the loss of population from the proposed deactivation of the 351 MW and the DoD and Air Force restructuring. However, the basing of the B-2, T-38, and A/OA-10 aircraft at Whiteman AFB could reduce population and employment losses within the Whiteman AFB ROI, resulting in insignificantly adverse cumulative impacts.

The analysis method used to determine cumulative impacts was similar to the method used to analyze impacts of the proposed action, as stated in 4.10.1. The analysis is based on an approximate 3-year deactivation (FY 1993 to 1995) schedule and an 8-year (FY 1992 to 1999) schedule for the basing actions. If the latter schedule were delayed, the socioeconomic environment could be significantly adversely affected during the short term, yet recover with the eventual addition of new missions. The earlier the new missions are added, the less significant the impacts are likely to be.

The following text briefly discusses several scenarios relating to the potential cumulative socioeconomic impacts of the MM II action in conjunction with the basing of the B-2 at Whiteman AFB. The number and fluctuation of military and civilian jobs located on Whiteman AFB are the key factors that will ultimately influence other socioeconomic factors in the region, including population, housing, retail sales, school enrollment, and taxes.

5.2.2.1 Proposed Action with Basing of the B-2 and Other Aircraft

The cumulative socioeconomic impacts of the MM II deactivation and aircraft basing at Whiteman AFB could result in an insignificant adverse impact to the local economy.

The cumulative personnel changes from the MM II deactivation and aircraft basing at Whiteman AFB over the next seven years (FY 1993 to 1999) could result in a net decrease of approximately 350 personnel employed at the base. (However, it should be noted that the Whiteman AFB 1992 baseline employment of 3,710 includes 455 basing personnel added in 1992. Some of these personnel may not yet have arrived at Whiteman AFB. These personnel would help offset the losses that are expected between 1993 and 1999.) Table 5.2.2.1-1 shows annual and cumulative personnel changes that are expected as a result of the proposed actions and DoD's overall force reductions.

Table 5.2.2.1-1
Annual and Cumulative Personnel Changes Under MM II Proposed Action, B-2 Basing Action, and DoD Overall Force Reductions

	FY93	FY94	FY95	FY96	FY97	FY98	FY99	Total
MM II Deactivation, Proposed Action	-255	-492	-901	0	0	0	0	-1,648
B-2 Basing Action	533	446	223	130	176	115	4	1,627
DoD Overall Force Reductions	-31	-255	-13	0	-32	0	0	-331
Total *Annual* Change, Both Actions and Force Reduction	247	-301	-691	130	144	115	4	-352
Total *Cumulative* Personnel Change, Both Actions and Force Reduction	**247**	**-54**	**-745**	**-615**	**-471**	**-356**	**-352**	

Source: HQ SAC/XPM, 1992.

As shown in figure 5.2.2.1-1, the number of personnel could fluctuate over the next 8 years. The future base employment projected for Whiteman AFB under this scenario differs substantially from the single action of the MM II deactivation, which calls for a net personnel loss of approximately 1,650 personnel within a 3-year period. The cumulative effect of the future actions at Whiteman AFB could also result in employment fluctuations over the same time period, which could produce some short-term adverse economic impacts. However, the small net decrease in jobs anticipated at Whiteman AFB is expected to provide only an insignificant adverse impact on the local economy.

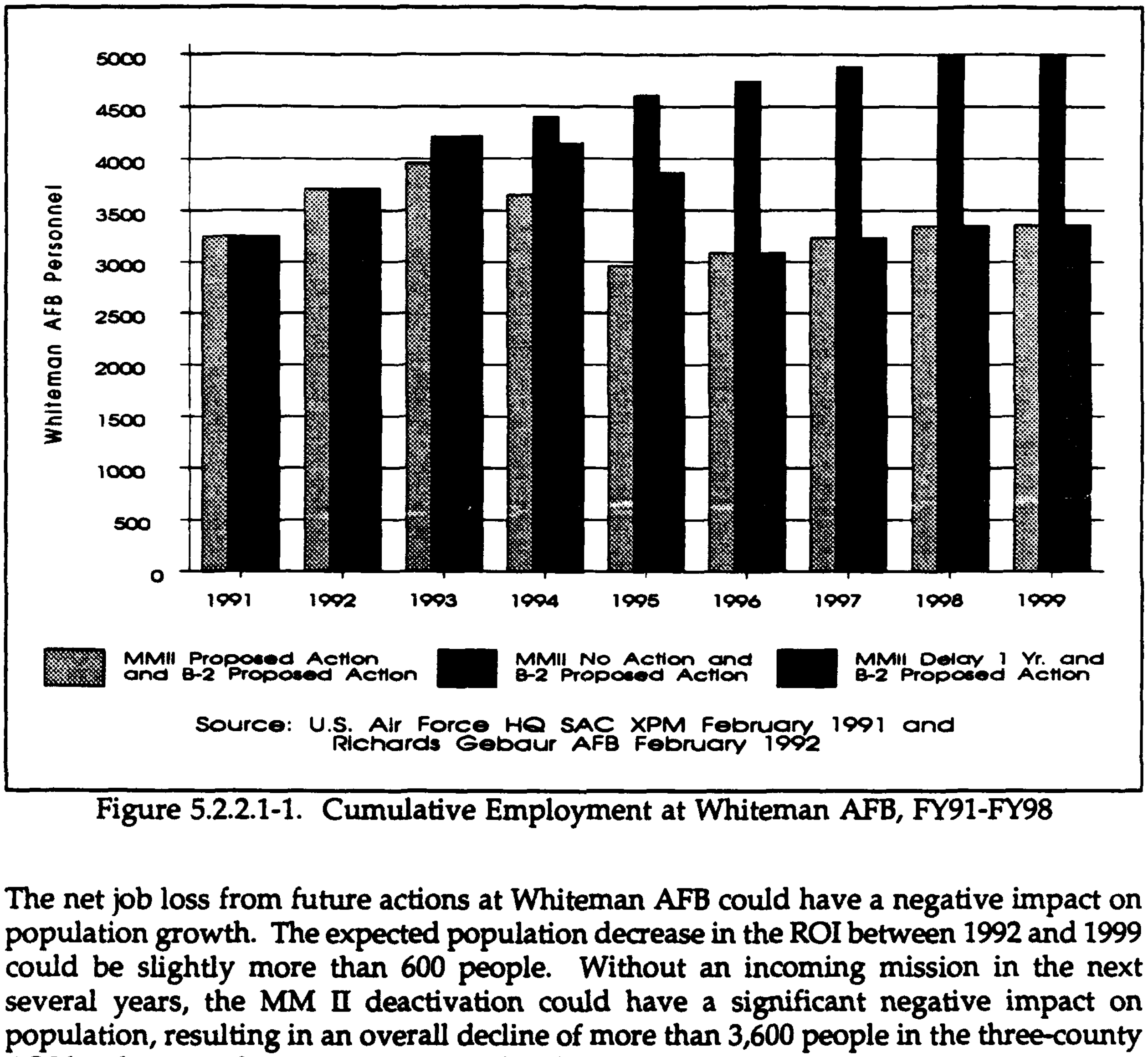


Figure 5.2.2.1-1. Cumulative Employment at Whiteman AFB, FY91-FY98

The net job loss from future actions at Whiteman AFB could have a negative impact on population growth. The expected population decrease in the ROI between 1992 and 1999 could be slightly more than 600 people. Without an incoming mission in the next several years, the MM II deactivation could have a significant negative impact on population, resulting in an overall decline of more than 3,600 people in the three-county ROI by the time deactivation is completed.

The transfer of personnel into and out of Whiteman AFB could have some slight adverse impacts on local housing markets, particularly in the Knob Noster community. In a single year, the net change in base employment could vary from as many as 460 additional personnel to a loss of approximately 700 personnel. It is anticipated that these extremes would neither create a tight housing market (with increased rents), nor cause a significant increase in housing vacancy rates, respectively. Johnson County alone has approximately 15,400 housing units that could accommodate this level of fluctuation in housing supply and demand without serious impacts on the overall housing market.

The retail and service business sectors may experience insignificant adverse impacts from the decrease in population anticipated from the combination of the MM II deactivation and aircraft basing. While short-term impacts may occur, it is likely that the fluctuation

in the number of Whiteman AFB personnel is insufficient to cause significant adverse business impacts over the long term.

School enrollments could also decrease by approximately 100 students (about five percent of total enrollment) in Knob Noster, as opposed to the 450-student decline projected under the proposed MM II deactivation alone. Warrensburg could experience a similar enrollment loss (less than four percent of its total enrollment), while other schools in the ROI could experience slight enrollment decreases over the 8-year period. Category B Federal impact aid could also decrease slightly if numbers of students living off-base decline; this would be an insignificant impact to local school budgets. There could be short-term adverse impacts related to fluctuating numbers of base personnel and their dependent students in the relatively small school districts serving the ROI.

Cumulative rural land use impacts in the deployment area are not expected to differ from those described in section 4.10.2.7 for the MM II deactivation. However, there could be land use changes in populated areas near the MSB as a result of the incoming aircraft missions. These potential changes will be discussed fully in the environmental impact statement now being prepared on the beddown of the B-2 and other aircraft at Whiteman AFB.

Cumulative impacts to the electric companies and cooperatives serving the LFs and LCFs would likely be the same as those discussed in 4.10.2.8. However, Missouri Public Service, which serves the MSB, could experience insignificant adverse cumulative impacts from the slight decrease in electricity demand.

5.2.2.2 No Action (Continued Operations) With Basing of the B-2 and Other Aircraft

This cumulative action assumes that the MM II system remains fully activated and the B-2 bomber is based at Whiteman AFB. This scenario could have a significant impact on regional employment from the projected net increase of an estimated 1,500 base employees over an 8-year time period (see figure 5.2.2.1-1). Depending on when this employment increase occurs, the existing capacity of housing and educational facilities in the region could be stressed. Increased population and growth in housing demand could result in adverse land use impacts if proper land use planning principles are not used to plan for this growth, which would likely occur primarily in Johnson County.

5.2.2.3 Delayed Deactivation With Basing of the B-2 and Other Aircraft

The delay in deactivating the 150 MM II systems for 1 year, when considered with the basing of the B-2 bomber at Whiteman AFB, could cause larger fluctuations in personnel numbers at Whiteman AFB than projected under the scenario of the MM II proposed action starting in October 1992 (see figure 5.2.2.1-1). These larger fluctuations would be attributable to the retention of 351 MW personnel while the B-2 personnel are arriving. This scenario could stress socioeconomic resources, including schools, housing, and public services.

5.2.2.4 Partial Deactivation With Basing of the B-2 and Other Aircraft

The partial deactivation alternative would involve only one or two of the three squadrons of the missile wing (351 MW). Partial deactivation would result in the loss of approximately 250 Whiteman AFB personnel for one squadron only and about 500 more personnal for the second squadron, for a total reduction of 750 personnel for both squadrons. This is less than one-half of the personnel loss that would occur under full deactivation, where 1,650 jobs would be lost. The retention of the third squadron, therefore, would leave about 900 jobs at Whiteman AFB that would be lost, probably in FY95, under full deactivation.

When the partial deactivation is considered cumulatively with the B-2 basing action, which has personnel arriving over a period of several years, the surrounding communities would experience much less fluctuation in population, housing demand, and school enrollment. The fluctuation would be less because the greatest single-year change involved in either the MM II or the basing action—the loss of 900 personnel authorizations in FY95—would be eliminated.

5.2.2.5 Other Deactivation Alternatives With Basing of the B-2 and Other Aircraft

The socioeconomic impacts for the other MM II deactivation action and implementation alternatives (missile removal and system shutdown, non-demolition, mechanical demolition, removal of the HICS, and removing the deep-buried UST LCFs) would be almost identical to the total deactivation of the MM II system described in 5.2.2.1. Under the missile removal and system shutdown alternative, a minimal MM II system workforce would be retained to perform continued maintenance of the deployment area facilities; the fluctuations of personnel numbers under the cumulative scenario would be slightly less than projected in section 5.2.2.1.

5.3 MM II SYSTEM-WIDE CUMULATIVE IMPACTS

As part of the MM II deactivation at Whiteman AFB, the Air Force Materiel Command (AFMC) would send C-141 transport aircraft to Whiteman AFB and perhaps missile transporters to retrieve the MM II boosters. Trains are another possible mode of transportation for the boosters. The deactivation of the MM II system at Ellsworth AFB and the conversion of the MM II system to a MM III system at Malmstrom AFB would also be occurring during the MM II deactivation at Whiteman AFB. Because there are a limited number of rocket motor shipping containers, a limited number of C-141 aircraft capable of carrying the boosters, and only a limited number of pads (5) on base for storing rocket motors, the process for moving the boosters to Hill AFB, UT, must be efficiently planned to prevent a slowdown of the schedule. Only 14 shipping and storage containers for ballistic missiles (air and rail transport) are now available for use (OO-ALC/LMMA, 1992). Hill AFB has seven empty containers that are exchanged for those shipped from the ICBM bases to Hill AFB. There are eight missile transporter trailers that are being retrofitted for continued operation. Missile transporters are moving to and from Hill AFB by road only at two ICBM bases: F.E. Warren AFB and

Malmstrom AFB. New tractors and trailers are currently being produced and should allow road and rail transport between Hill AFB and all ICBM bases within 12 to 18 months (OO-ALC/LMMA, 1992). There are four C-141 aircraft specially configured to carry the rocket motors and four additional aircraft are expected to be available by the end of 1992 (OO-ALC/LMMA, 1992).

AFMC (formerly AFLC) has prepared an environmental assessment on the transportation of rocket motors to Hill AFB for storage (USAF, 1991). The AFMC analysis is incorporated by reference into this EIS (per 40 CFR 1502.21). A summary of the document follows:

> The AFMC analysis evaluates the potential environmental impacts beginning from the signing for custody of the rocket motors by Ogden Air Logistics Center (OO-ALC) or an AFMC contractor. Historically, boosters have been transported to or from Hill AFB by air (54 percent), rail (20 percent), and highway (36 percent). There are no plans for altering the modes of transportation for MM II boosters, so a similar proportional relationship of transportation mode is likely to apply to the MM II missile phase-out.
>
> Under the proposed action, the boosters will be transported to Hill AFB in shipping containers with environmental control units to regulate the storage temperature. Upon arrival, the booster will be moved to a processing facility. Air-shipped boosters arrive in a shipping and storage container for ballistic missiles (SSCBM) and are placed on a ballistic missile trailer (BMT). The process of handling the motors will be identical to current operations. Rail shipments arrive as a combination SSCBM/BMT and are transferred from the rail car. Truck shipments move on site in a missile transporter (MT) tractor/trailer combination. The shipping containers are brought to a processing facility for separation into the three motor stages. The booster, in its carriages, is rolled from the shipping container into the facility. Hardware on the boosters will be removed at this time and the individual motors will be readied for storage. Individual stages can be moved in trucks configured for routine operation on public roads. Environmental control of the motors is maintained during their transport around Hill AFB.
>
> Storage at Hill AFB or its associated storage area, the Utah Test and Training Range (UTTR), would occur in specially designed structures. Earth-covered bunkers, above-ground reinforced concrete buildings covered with earth, would be used at Hill AFB. Two types of storage buildings, one with a reinforced concrete floor, roof, and walls and the other with a reinforced concrete floor and metal roof and walls, would be used at UTTR.
>
> No new construction would occur at Hill AFB or the UTTR and no new procedures would be implemented. Consequently, impacts to the soils, vegetation, land use, cultural resources, air quality, and water quality in

these areas are predicted to be negligible. A small increase in highway traffic between Hill AFB and the UTTR would occur but the impacts to the transportation network, acoustic environment, and air quality would be slightly adverse, but negligible during the MM II rocket motor transportation and storage program. Over the long term, decreased traffic with a negligible benefit to air quality, acoustic environment, and transportation networks would occur. Socioeconomic impacts in the area would be negligible. Over the long term, only 10 to 20 workers would be reassigned upon completion of this program. There would also be a slight increase in air, highway, and rail traffic from the MM II bases to Hill AFB during the deactivation/conversion programs. The Air Force has been handling and transporting boosters for over 30 years and has an excellent safety record. No health and safety impacts are anticipated from the proposed action. The study concluded that there would be no significant impacts to the aforementioned resources from the long-distance transportation of rocket motors. The EA evaluated a maximum credible event to investigate the environmental impacts of an extreme scenario occurring (an airplane transporting a booster crashes in a populated area). While fatalities and adverse environmental impacts were predicted by the extreme scenario, the event is highly unlikely to occur and consequently, the risks associated with such an event are considered to be acceptable.

A finding of no significant impact for the AFMC action was signed on September 27, 1991. Consideration of the potential environmental impacts of handling and storage of the rocket motors from the launch facilities to the missile support base and then to Hill AFB reveals no significantly adverse cumulative impacts of the combined projects. Although concurrent actions involving the MM II missiles are occurring at Hill AFB, Malmstrom AFB, and Ellsworth AFB, these areas are physically separated from Whiteman AFB. Consequently, there is no situation where an impact that is insignificant at several bases can be considered as a cumulatively significant impact. One possible situation affecting all of these bases involves the dependency on shared resources of a limited quantity: booster shipping containers and MTs. However, storage capacities at each base would not be exceeded and boosters would not be brought in without an empty storage container in reserve at the MSB. The rocket motors would remain at the launch facilities until available space opens up from the shipment of a rocket motor to Hill AFB, or an empty shipping container is sent to the MSB. A significant cumulative impact caused by these limited resources is therefore unlikely.

5.4 CUMULATIVE IMPACTS THROUGH TIME

The population change projected from the MM II action over time must be considered with those projected for other proposed base missions. In the context of related recent changes, the community population change resulting from the proposed action for the MM II deactivation is predicted to vary minimally from current levels. Whiteman AFB has undergone fluctuations in base personnel levels in the past as part of a changing defense program. Only minor changes in the personnel levels at the base have occurred

recently. The future population changes can be viewed cumulatively as causing insignificant impacts to the local and regional economies.

CHAPTER 6
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6.0 REFERENCES

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CHAPTER 7
ORGANIZATIONS AND PERSONS CONTACTED

7.0 ORGANIZATIONS AND PERSONS CONTACTED

The following organizations and persons were contacted during the preparation of this EIS:

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Pettis County, MO
Mr. James McMullen, Commissioner

Bates County, MO
Ms. Marlene Wainscott, Presiding Commissioner

Henry County, MO
Mr. Harold Smith, Commissioner

Saline County, MO
Leaman Jennings, University Extension Agent

Cooper County, MO
Ms. Darlene Boehm, Presiding Commissioner

Morgan County, MO
Mr. Jenkins, County Clerk

Moniteau County, MO
Mr. Steve Napier, Commissioner

Douglas County, NE
Mr. Dennis Ferraro, Cooperative Extension Service, University of Nebraska

Knob Noster, Warrensburg, Sedalia, La Monte
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Mr. John Brummell, Knob Noster School District
Mr. Doug Domer, Lamonte School District
Dr. Edmonds, Central Missouri State University
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Mr. Bob Griffey, Sedalia School District
Mr. Jeff Hancock, Warrensburg City Administrator
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Mr. Ron Miller, Windsor School District
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CHAPTER 8
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CHAPTER 9
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9.0 INDEX

APPENDIX A

APPENDIX A

PESTICIDE PERSISTENCE AND TRANSPORT MODELING

The fate and transport of pesticides for a representative application scenario was simulated using the GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) computer model developed by the U.S. Department of Agriculture, Agricultural Research Service (USDA ARS) (Leonard *et al.*, 1987; Leonard *et al.*, 1988). GLEAMS evaluates the movement and degradation of chemicals within the plant root zone of field-size areas under various crop management systems. The model was tested and validated with pesticide and bromide movement data (Leonard *et al.*, 1987). The hydrology and erosion components of GLEAMS are essentially the same as those of the CREAMS (Chemicals, Runoff, and Erosion from Agricultural Management Systems) model (Knisel, 1980). CREAMS is a physically based model that has been validated with data from diverse climatic and physiographic regions (Knisel, 1980; Foster and Ferriera, 1981; Lorber and Mulkey, 1982; Knisel *et al.*, 1983). Improvements made during the development of GLEAMS include a new emphasis on predicting chemical losses through leaching to ground water and a more sophisticated handling of irrigation. Figure A-1 illustrates the processes represented by GLEAMS. The structure and function of the model are discussed briefly here. The GLEAMS and CREAMS documentation should be consulted for more detailed information.

The hydrology component of GLEAMS subdivides the soil within the rooting zone into as many as 12 computational layers. The surface layer is taken to be 1 centimeter (cm) thick, and the other layers are adjusted to account for the remainder of the rooting zone. Data on soil porosity, water retention characteristics, and organic matter content for the site-specific soil layers (horizons) are collected for model initialization. During a simulation, GLEAMS computes a continuous accounting of the water balance for each layer, including percolation, evaporation, and transpiration. Evaporation of chemicals from the soil surface is not represented, but evaporation can cause chemicals to move upward through the soil.

The erosion component of GLEAMS accounts not only for the basic categories of soil particle size (sand, silt, and clay) but also for small and large aggregates of soil particles. Furthermore, the program accounts for the unequal distribution of organic matter between soil fractions. This information along with surface-area relationships is used to calculate an enrichment ratio that describes the greater concentration of chemicals in eroding soil as compared with the concentration in surface soil.

The pesticide component of GLEAMS can represent chemical deposition directly on the soil, the interception of chemicals by foliage, and subsequent washoff. Degradation rates are allowed to differ between plant surfaces and soil, and between soil horizons.

Degradation calculations are performed on a daily time interval. Redistribution of chemicals because of hydrologic processes is also calculated on a daily time step. The

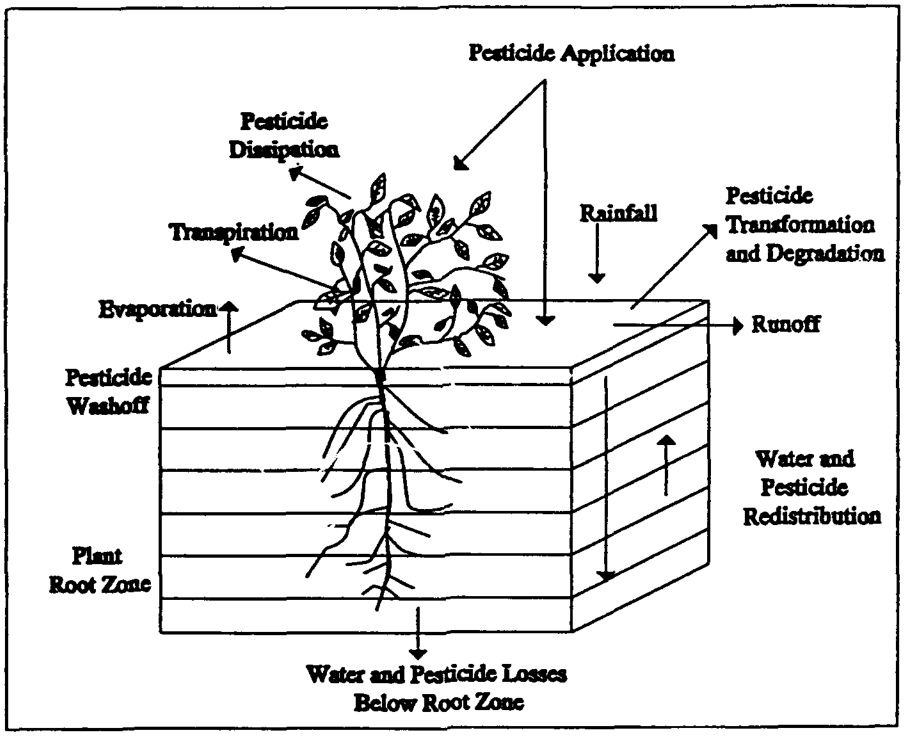

Figure A-1: The Physical System and Processes Represented in GLEAMS. Source: Leonard *et al.*, 1987.

distribution of a chemical between dissolved and sorbed states is described as a simple linear relationship, which is directly proportional to the organic carbon partition coefficient (K_{oc}) (a property of the chemical) and the organic matter content of the soil. GLEAMS calculates the extraction of chemicals from the soil surface into runoff, accounting for sorption (assumed to be relatively rapid) and using a related parameter describing the depth of the interaction of surface runoff and surficial soil. Percolation of chemicals is calculated through each of the soil layers, and the amount that passes through the last soil layer is accumulated as the potential loading to the vadose zone or groundwater.

The overall sequence of model components operation is illustrated in figure A-2, which was adapted from the Washington Computer Center CREAMS manual (USDA, 1984). The interrelationship of components is essentially the same in GLEAMS, except that the components are integrated into a single program, allowing intermediate files to be passed in memory. Input data required by the GLEAMS model consist of four separate files: rainfall data, hydrology parameters, erosion parameters, and chemical parameters.

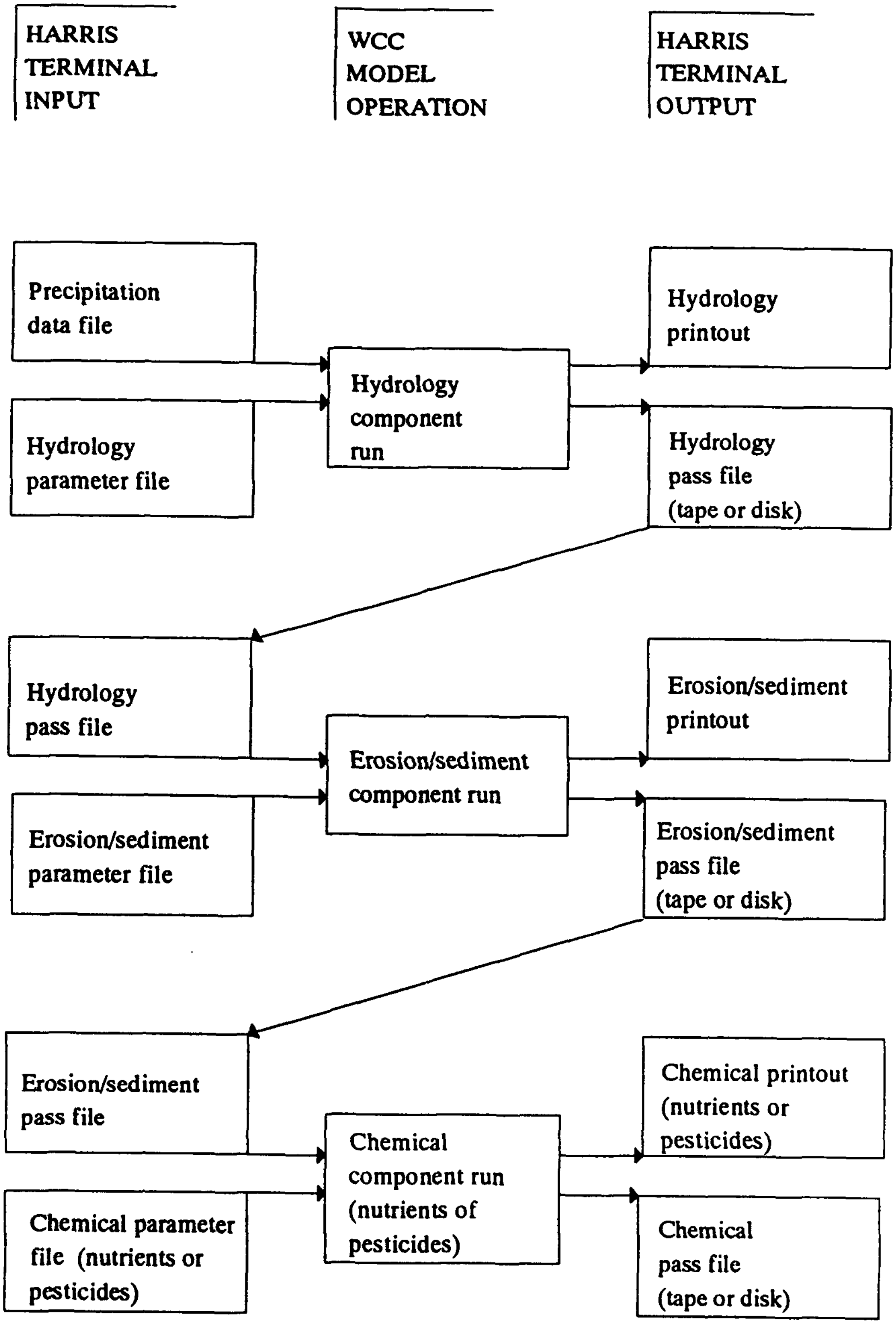

Figure A-2: Flow chart of CREAMS model operation (from USDA, 1984)

The rainfall data were simulated for Kansas City, Missouri, with a "climatic generator" program obtained from Dr. Frank Davis, USDA Agricultural Research Service, Tifton, Georgia. The program contains a database with statistical characteristics of rainfall patterns for selected locations around the country, including Kansas City, and it produces daily precipitation files in the format required by GLEAMS. Monthly maximum and minimum temperature files were obtained from the same source. Most other parameters were determined using tables and guidance contained in the GLEAMS program and documentation (Knisel *et al.*, 1987) and the documentation for CREAMS (Knisel, 1980; USDA, 1984) based on typical soil for the region. Precipitation, hydrology, erosion, and chemical parameter files were prepared for a representative scenario.

The hydrology parameter file contains information on the geometry and topography of the field, hydraulic conductivity, soil water storage, leaf area indices, and irrigation practices. This file also contains the Soil Conservation Service "curve number," which describes the tendency for water to run off the surface of the soil.

The erosion parameter file contains the information necessary to calculate erosion, sediment yield, and particle composition of the sediment on a storm-by-storm basis. The input data can represent a number of optional configurations of fields, channels, and impoundments, but the representative scenario for analysis in this study represented a single channel draining a site. Runoff flowing into the channel could be considered as discharge to receiving waters outside the analysis region, typically streams and rivers. The erosion parameter file input to GLEAMS contained parameters describing soil erodibility, soil particle size distributions, area of the pond, and other surface characteristics relevant to erosion.

Output from the GLEAMS model includes for each chemical a storm-by-storm accounting of concentrations by soil layer and the movement of chemical residues in percolating soil waters, surface runoff waters, and those residues sorbed to eroded soil particles. An auxiliary program can be used to generate graphs of the total mass per unit area of each chemical over time. Separate output files are produced describing hydrology and erosion in more detail.

Simulation of Pesticides in Soil

Simulation of herbicides used as soil sterilants at a launch facility (LF) were performed to investigate the potential for residual pesticide movement through leaching to ground water and to ascertain whether residual concentrations are high enough to pose a hazard to humans or wildlife.

The pesticides modeled included Pramitol 25E, Expedite, and Arsenal. The use of Norsac 10G was discontinued in the mid- to late-1980s. Howard *et al.* (1991) have reported a soil half-life of 4 weeks to 1 year, and Menzie (1974, as cited in NLM 1992) reported a half-life of 19 weeks (at 26.7 °C). On the basis of these two factors, Norsac 10G was eliminated from modeling efforts because it would have been almost gone by the start of site dismantlement activities. The only insecticide used in the deployment

area was Micro-gen ULD BP 100. This pesticide (pyrethrum is the active ingredient) was used indoors at the LCFs to control beetles. Pyrethrum is not persistent, is destroyed by light, and is biodegradable (Mrak, 1973). Because of its low persistence and the unlikely penetration of this pesticide through the building foundation, Micro-gen ULD BP 100 was not modeled for this analysis.

The GLEAMS simulations were conducted using a spring pesticide application date (a typical application schedule) and meteorological data for the west central Missouri area. Assumptions and inputs to the model included the following:

- Computer runs were conducted using a silt loam soil texture. A silt loam is a moderately fine soil and is the dominant soil type within the deployment area.

- Soil characteristics for the silt loam were assumed to correspond to hydrologic soil group B of the model, indicating moderately good infiltration potential.

- Weather records were simulated for a 5-year period using daily precipitation probability and temperature statistics for Kansas City. A climatic simulator program developed by USDA ARS, based on data from the National Weather Service was used.

- Vegetation was assumed to be either nonexistent or sparse grass.

- Each pesticide was applied for two years beginning April 1.

- The assumed pesticide application rates are shown in table A-1. The application rate for Pramitol 25E was assumed to be the medium-high range indicated by the *Crop Protection Chemicals Reference* (1989). This may be an overestimation of the actual application rate.

- The SCS runoff curve number was assumed to be 86, the expected number for a fallow condition.

- The simulations were performed to a 36-inch (91-cm) depth, the depth of the soil profile at which significant residues are expected to occur. The soil's surface layer was 1 cm thick, the next layer extended from 1 cm to 9 cm, layers three through six were each 9 cm thick, layers seven and nine were each 15 cm thick, and layer eight was 16 cm thick.

- The number of soil horizons in the root zone was assumed to be two. Silt loam soil makes up the first horizon (extending from 1 to 45.7 cm) and silty clay loam soil makes up the second horizon (extending from 45.7 to 92 cm). The silt loam soil and the silty clay loam soil were assumed to have a 2-percent and a 1.5 percent organic matter content, respectively. The slope was set at 5 percent, a realistic measure for the launch facility sites. A low

organic matter content and a low slope were intentionally used to maximize the potential for infiltration and leaching.

- The porosity was assumed to be 0.43 and 0.47 and the bulk density was assumed to be 1.5 and 1.4 for horizon 1 and 2, respectively.

- The field capacity was assumed to be 0.32 and 0.36 for horizon 1 and 2, respectively.

- The erodibility was assumed to 0.42, which is typical for a silt loam (based on the Pesticide Root Zone Model manual, Carsel *et al.*, 1984)

- The soil's saturated conductivity was assumed to be 0.225 inches per hour (in/hour), on the basis of the texture and vegetative cover.

- The field area was assumed to be 1 acre. Because lateral uniformity was assumed, this parameter was not important for the leaching analysis.

- The half-life of Pramitol 25E was set at 180 days (NLM, 1992). The half-life of Arsenal was set at 27 days (Michael, 1986).

- Half-lives for the other pesticides and solubilities and organic carbon partition coefficients were based on the GLEAMS database. Table A-1 illustrates the environmental fate data that were used to model the persistence and migration of the pesticides.

Table A-1
Environmental Fate Data for Pesticides Used at LFs.

Pesticide	Solubility (mg/kg)	Half-Life (days)	K_{oc}	Application Rate (kg/ha)
Pramitol 25E	750.0	180.0	300.0	45.0
Expedite	12,000.0	30.0	500.0	2.46
Arsenal	1,000.0	27.0	37.0	1.13

Source: GLEAMS database; Michael, 1986; USDA, 1988.

The results of the simulation are depicted in figures A-3 through A-5. Residues of Pramitol 25E in the top 10 cm of soil were calculated as high as 8 ppm in the second year of application. One year later, the maximum concentrations (still in the top 10 cm) are expected to remain the same. By the fifth year, the maximum concentration is expected to decrease slightly to 6 ppm. The reduction of maximum residues over time is due to a combination of degradation and spreading of residues through the soil profile by percolating water. Because of their short half-lives, all other pesticides are expected

to dissipate almost completely after the year of application. Leaching of Pramitol 25E beyond 91 cm (36 in., the lowest depth simulated) was not expected to be above 0.0045 ppm during the modeling period (5 years).

Runoff of the pesticides during the 2 years of application and several subsequent years is presented in table A-2. The loss through runoff is given in grams per hectare (g/ha) and the percentage of pesticides that were applied (% app). The potential for runoff exists only if heavy rains occur soon after application. Runoff of the pesticides would occur to a greater extent from any sites that have more erodible soils or greater slopes than assumed for the example scenario, but the overall conclusion would not change over the expected range of conditions. Runoff of residual pesticide is not considered to be a significant hazard.

Table A-2
Loss of Pesticides Through Runoff During 5-Year GLEAMS Model Simulation

Pesticide	Runoff (yr 1)		Runoff (yr 2)		Runoff (yr 3)		Runoff (yr 4)		Runoff (yr 5)	
	g/ha	% app	g/ha	% app	g/ha	% app	g/ha	% app	g/ha	% app
Pramitol® 25E	1,428.0	3.17	1,422.3	1.58	2,264.1	2.52	4,118.1	4.58	1,368.5	1.52
Expedite	51.1	2.08	62.5	1.27	112.1	2.28	221.0	4.49	53.7	1.09
Arsenal	3.9	0.35	5.5	0.24	22.6	1.00	21.2	0.94	17.7	0.78

Source: GLEAMS Model runs by LABAT-ANDERSON Incorporated, 1992.

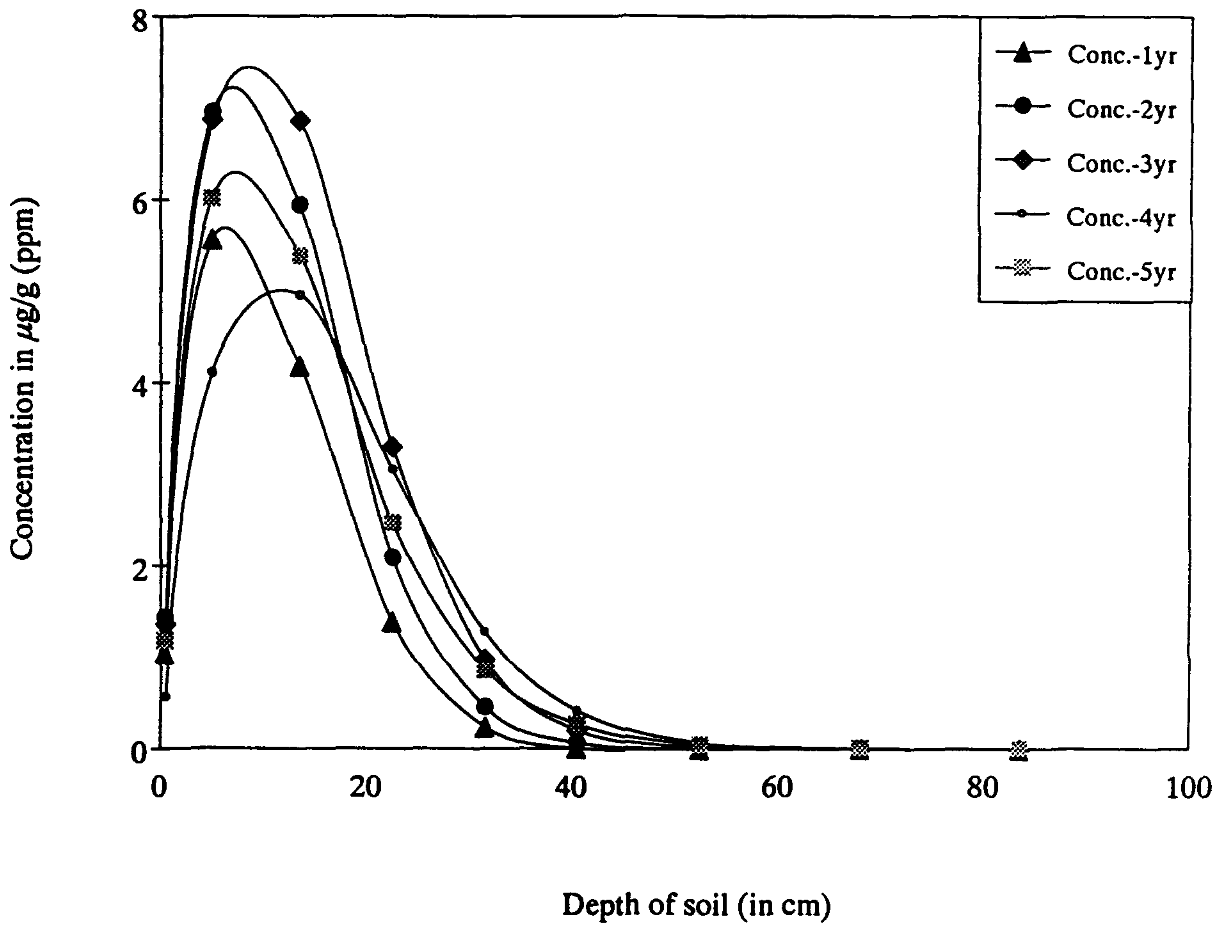

Figure A-3: Concentration of Pramitol 25E in soil over 5 years.

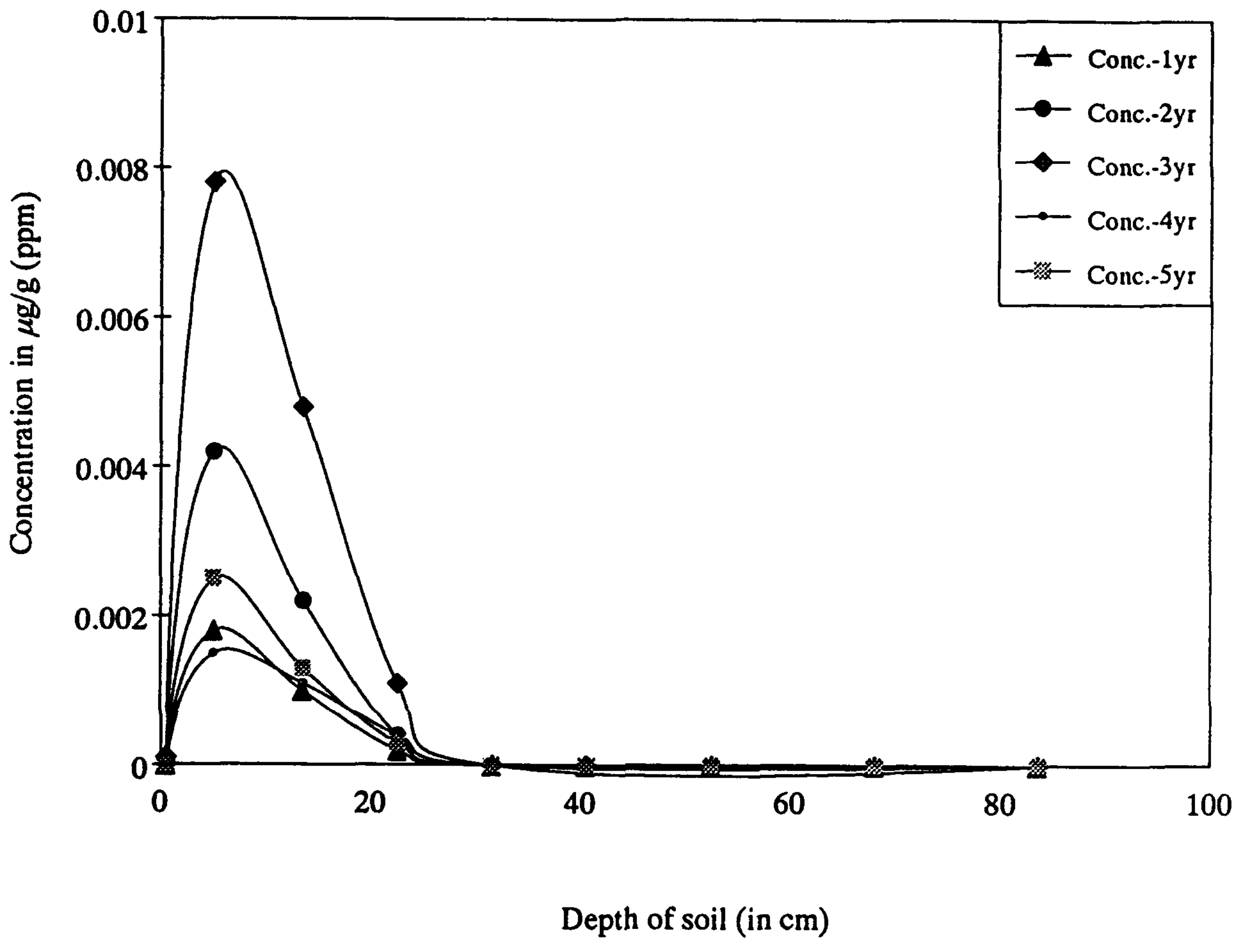

Figure A-4: Concentration of Expedite in soil over 5 years.

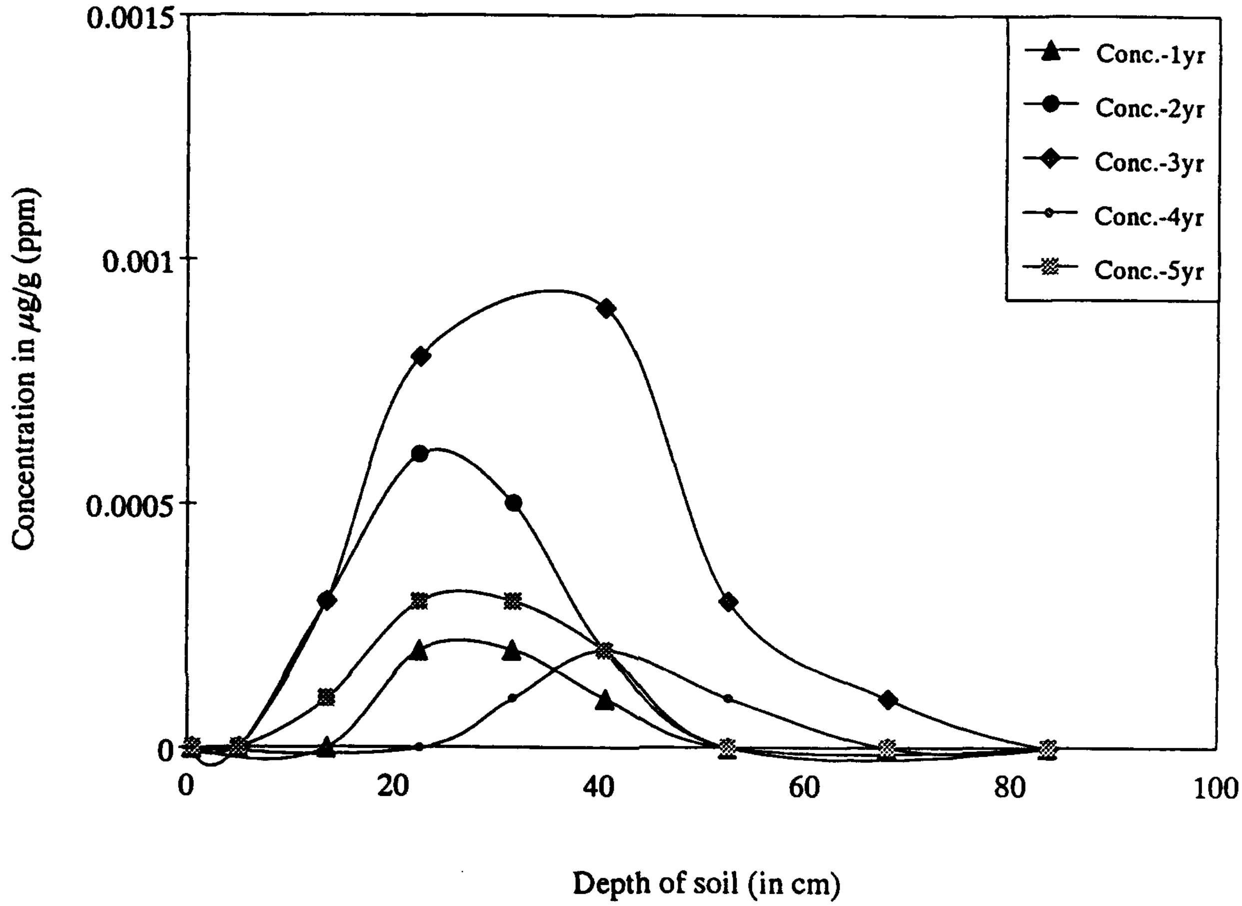

Figure A-5: Concentration of Arsenal in soil over 5 years.

APPENDIX B

APPENDIX B

LEAD TRANSPORT MODELING

The transport of lead into ground water was simulated using the Method of Characteristics (MOC) computer model developed by the U.S. Geological Survey (USGS) (Konikow and Bredehoeft, 1978; Good and Konikow, 1989; Konikow and Bredehoeft, 1989). The MOC is a two-dimensional solute transport model that computes solute concentration changes over time caused by the processes of convective transport, hydrodynamic dispersion, mixing or dilution from fluid recharge, chemical reactions and sorption. The reactions include first order irreversible rate reaction, reversible equilibrium controlled sorption with linear Freundlich or Langmuir isotherms, and reversible equilibrium controlled ion exchange for monovalent or divalent ions. The model is capable of determining the concentration of a dissolved chemical species in an aquifer at any specified place and time. Although the aquifer may be heterogeneous and/or anisotropic, the model assumes that gradients of fluid density, viscosity, and temperature do not affect the velocity distribution.

The MOC couples the ground water flow equation with the non-conservative solute-transport equation. The computer program uses the alternating-direction implicit (ADI) procedure to solve the finite difference approximation of the ground water flow equation. The model uses the method of characteristics to solve the solute transport equation. It uses a particle tracking procedure to represent convective transport and a two-step explicit procedure to solve the finite fluid sources and sinks, and divergence of velocity. The explicit procedure is subject to stability criteria, but the program automatically determines and implements the time-step limitations necessary to satisfy the stability criteria.

The MOC uses a rectangular, block-centered, finite difference grid for flux and transport calculations. The grid size for flow calculations is limited to 40 rows and 40 columns. The grid size for transport calculations is limited to 20 rows and 20 columns, which can be assigned to any area of the flow grid. The program allows spatially varying diffuse recharge or discharge, saturated thickness, transmissivity, boundary conditions, initial heads and initial concentrations, and an unlimited number of injection or withdrawal wells. Up to five nodes can be designated as observation points for which a summary table of head and concentration versus time is printed at the end of the calculation.

Leaching of Lead from Lead-based Paint in the Launch Tube

Areas with shallow aquifers tend to be susceptible to the leaching of chemicals into the ground water from natural infiltration and/or seepage. Through the use of a ground-water transport model, it is possible to make a general estimate of the rate of transport of lead via ground water in shallow unconfined aquifers. The model can be applied to the immediate area of the launch facility (LF) launch tube and headworks that can facilitate the migration of lead leached from paint in the launch tube through fractures

in the sides of the launch tube caused by explosive demolition. On the basis of past seepage incidents, it is likely that seepage of ground water would occur at some sites.

The leaching and transport of lead was estimated on the basis of an atypical or extreme situation but one that has a basis in reality. The following text describes the assumptions used in calculating the concentration of lead in ground water and estimating the time of transport to a nearby, shallow well used for drinking water.

The amount of lead that can leach from the paint in the launch-tube walls can be estimated and used to predict the concentration of lead in the ground water by using the following assumptions:

- There are 2 milligrams (mg) of lead per square centimeter (cm^2) of area over a 4,000,000 cm^2 surface area for each layer of lead-based paint in the launch tube (based on the assumption that the interior was totally repainted five times rather than spot painted, although spot painting is the standard practice).

- Blasting immediately removes 20 percent of the paint or exposes it, making that 20 percent more accessible to leaching and other subsurface breakdown processes.

- Five percent of the lead leaches out of the outermost layer of paint and into the ground water each year (i.e., all the lead is leached from this layer within 20 years). Modeling runs were also computed for 20 percent, 50 percent, and 100 percent lead-leaching scenarios.

- The lead from the inner layers of paint (80 percent of the paint) would leach at a much slower rate.

- Five percent of the lead is equivalent to approximately 400 grams (g) of lead (based on the lead concentration multiplied by the surface area, multiplied by the number of layers, multiplied by the proportion of exposed paint, and multiplied by the proportion of lead leached per year).

Ground-water Transport From a Launch Tube to a Public/Private Well

This calculation of ground-water transport is based upon certain assumptions, listed below, from the evaluations of information presented previously in sections 3.3.3 and 3.3.4.

- Potable shallow wells for domestic use are one-fourth to one-half of a mile downgradient from the launcher. Study and identification of well locations on maps, including topographic maps, indicates that there are some potable shallow wells found within these distances downgradient from a launcher.

- The ground-water depth is 20 feet (ft), and the total aquifer thickness is 50 ft.

- The geology of the unconfined shallow aquifer penetrated by the launch tube and downgradient public/private well consists of alluvium serving as the aquifer with a confining unit below. Although there are few alluvium aquifers in the deployment area, this represents a conservative assumption.

- The aquifer was assumed to be isotropic; that is, the hydraulic conductivity was assumed to be independent of direction.

- It is known that the launch tube, including the concrete and steel bottom, is approximately 90 ft deep, with 60 ft making up the tube proper and 30 feet constituting the headworks.

- The ground water has immediate access to the lead-based paint, and leaching begins instantaneously. In reality, the rate of seepage, as well as the kinetics of the leaching reaction, should be considered. The less damage that results from explosive demolition, the slower the seepage would be in and out of the launch tube.

- Adsorption of lead was calculated using a Langmuir equation, based on coefficients ($K = 9.7 \times 10^5$ liters per mole (L/mol) and b = millimoles per kilogram (347 mmol/Kg)) reported by Schnoor *et al.* (1987) for Wyoming montmorillonite clay. The Langmuir equation applies to non-linear equilibrium adsorption, which is appropriate for the type of ion-exchange adsorption expected for lead ions.

- The hydraulic conductivity is 3.28×10^5 feet per second (ft/s) (10^{-3} cm/s). This value corresponds to a fine sand to silt which could be present in a shallow unconfined layer. In reality, the hydraulic conductivity would likely be slightly lower because of clay associated with the sand and silt. The transmissivity is 1.64×10^{-3} ft^2/s.

- The porosity is 40 percent. This value is realistic for a fine sand that has minimal clay in the interstices. In reality, the porosity value may be lower because of the presence of clay in the sand.

- The bulk density is 1.5 grams per milliliter (g/mL).

- Ground-water flow within the modeled area was assumed to be at steady state, with a nominal recharge rate of 0.1 ft/year.

- The longitudinal dispersivity was 100 ft (moderate), and the lateral dispersivity was 0.15 times the longitudinal dispersivity (15 ft).

- One pumping well was located within the modeled area at a distance of 0.5 mile from the silo. The flow to the well was assumed to be 0.01 ft^3/s.

- The water table gradient is 5 percent. Five percent was selected as a reasonable but conservative estimate on the basis of the typical topography of the area. Average slope of the land surface over 1,000 ft is approximately 3 percent.

- The modeled area was divided into a grid with square cells of 44 ft x 44 ft.

Results of simulated ground-water transport over a 20-year period showed that lead concentrations from paint were not expected to exceed a fraction of 1 part per billion (1.0 µg/L) in any of the modeled cells adjacent to the facility. Using leach rates of 20, 50, or 100 percent per year would increase the estimated dissolved lead concentrations by approximately 4, 10, and 20 times, respectively. Under these extreme leaching rates, lead concentrations are predicted to be approximately 2 parts per billion, or less, within ¼-mile downgradient from the launch facility. Based on background concentrations of lead in ground water (mode and median of 5.0 µg/L and mean of 7.2 µg/L) from wells within the deployment area, no significant impacts to ground-water quality attributable to lead contamination are projected to occur under any leaching scenario.

APPENDIX C

APPENDIX C

TOXICOLOGY DATA

Cadmium

The Environmental Protection Agency (EPA) (1987a) reported the symptoms of cadmium toxicity resulting from acute exposures in humans to be nausea, vomiting, diarrhea, muscular cramps and salivation. In the case of severe intoxication, sensory disturbances, liver injury, and convulsions may result, which in fatal intoxications are followed by shock and/or renal failure and cardiopulmonary depression. Chronic non-occupational oral exposure to very high levels of cadmium has resulted in Itai-Itai disease in Japan, principally in multiparous women, characterized by pain, osteomalacia, osteoporosis, proteinuria, glucosuria, and anemia.

EPA (1987a) stated that cadmium does not readily cross the skin. Additional information on dermal parameters and dermal toxicity of cadmium is not available.

EPA (1987a) reported that cadmium is very readily absorbed following inhalation; as much as 96 percent of the cadmium deposited in the lungs may be absorbed. However, the Agency for Toxic Substances and Disease Registry (ATSDR, 1987) summarized studies that reported cadmium inhalation absorption rates in mammals of 10 to 60 percent. The ATSDR also reported that high acute pulmonary exposure of humans or experimental animals may lead to pneumonitis and severe pulmonary edema. Chronic exposure to low levels may result in dyspnea, decreased forced vital capacity correlating with increased urinary cadmium excretion, and increased mortality from respiratory disease among populations occupationally exposed to cadmium (ATSDR, 1987). The American Conference of Governmental Industrial Hygienists (ACGIH, 1989) has proposed a threshold limit value of 0.01 milligram per cubic meter (mg/m^3) as a time-weighted, average air concentration for cadmium exposure for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

EPA (1991a) considers cadmium a probable human carcinogen, with limited evidence from epidemiological studies (excess lung cancers were observed in studies of cadmium smelter workers) and sufficient evidence of carcinogenicity in rats and mice by inhalation and intramuscular and subcutaneous injection. Seven studies in rats and mice in which cadmium salts were administered orally have shown no evidence of carcinogenic response. The inhalation unit risk is 6.1 per milligrams per kilogram per day (mg/kg/day) by the inhalation route of exposure (EPA, 1991b).

EPA (1991a) has set oral reference doses, or acceptable daily intake levels for humans, of 0.0005 mg/kg/day for ingestion of cadmium in water and 0.001 mg/kg/day for ingestion of cadmium from food. The two different levels are set because the absorption of cadmium varies with the source. These reference doses reflect the data obtained from

many studies on the toxicity of cadmium in both humans and animals. Renal toxicity is the most commonly reported systemic effect in laboratory animal studies of cadmium. Increased resorptions and fetotoxicity were noted in a teratology study in rats at a dose of 10 mg/kg/day (EPA, 1987a). Fetal growth retardation resulted when gestational rats were exposed to 100 milligrams per liter (mg/L) of cadmium in their drinking water, but such effects were not observed at an exposure level of 10 mg/L (EPA, 1987a).

Dichlobenil (Norsac)

Dermatitis was reported in six workers exposed to dichlobenil while mixing and bagging the insecticide (Hayes and Laws, 1991). However, it was found that dichlobenil is not a dermal sensitizer, on the basis of a study of a 10-percent formulation on guinea pigs (EPA, 1986).

EPA (1991) stated that there are insufficient data for determining the oncogenic potential of dichlobenil. Based on a two-year feeding study in dogs, EPA's Office of Pesticide Programs recommended an oral reference dose, or acceptable daily intake level, of 0.0005 mg/kg/day (EPA, 1991). Changes in liver histopathology and clinical chemistry parameters were observed at a dose of 1.25 mg/kg/day; the no-observed-effect level (NOEL) was 0.5 mg/kg/day.

Glyphosate (Expedite)

Studies in humans demonstrated no evidence of photoirritation, allergic contact dermatitis, or photoallergic contact dermatitis following dermal exposure to glyphosate (EPA, 1988a). A study of rabbits did not result in any observable dermal irritation (Hayes and Laws, 1991). A dermal absorption rate of 3 percent for glyphosate was found in a study of humans (EPA, 1988b).

A 4-hour inhalation toxicity study of rats revealed an LC^{50} (median lethal concentration) of 3.28 parts per million (ppm) for one glyphosate formulation (USDA, 1984).

EPA (1992) recently concluded that glyphosate is not classifiable as to human carcinogenicity at this time. In a study of mice, observed renal tumors were judged not to be related to glyphosate dosing. Failure to test the maximum tolerated dose in a rat study resulted in decreased significance for the results obtained; EPA has requested that this study be repeated to provide better data for evaluating glyphosate's carcinogenic potential. Although glyphosate was previously considered to be a possible human carcinogen, EPA currently believes that there is insufficient information on which to base such a conclusion.

EPA (1992) has set an oral reference dose, or acceptable daily intake level, of 0.1 mg/kg/day, on the basis of adverse effects to the kidneys of offspring in a reproduction study of rats at a dose of 30 mg/kg/day. Systemic effects observed in laboratory animals include decreased pituitary gland weights in dogs at a dose of 100 mg/kg/day (EPA, 1992). In a developmental study of rats, an increase in unossified sternebrae was

noted at a dose of 3,500 mg/kg/day; the NOEL for this effect was 1,000 mg/kg/day (EPA, 1992). No teratogenic effects were observed in a study of rabbits at the highest dose tested of 30 mg/kg/day (Hayes and Laws, 1991).

Imazapyr (Arsenal)

There is no information on human exposures to imazapyr.

Imazapyr was shown to be mildly irritating in dermal tests of rabbits (Humburg et al., 1989). The acute dermal LD_{50} in rats and rabbits was reported to be greater than 2,000 mg/kg (American Cyanamid, 1986). No systemic effects were observed at the highest dose tested of 400 mg/kg/day in a 21-day dermal study of rabbits (EPA, 1985). There was no evidence for dermal sensitization in guinea pigs (EPA, 1985). No studies are available on the rate of dermal absorption of imazapyr. However, on the basis of observed rates of dermal penetration for various herbicides, USDA (1984) assumed a dermal penetration rate of 10 percent for cases in which no data were available.

An acute inhalation LC_{50} of greater than 1.3 mg/L was reported for rats (EPA, 1985).

American Cyanamid (1986) reported a 13-week dietary study of rats in which no adverse effects were observed at the highest dose tested of 10,000 ppm of imazapyr in food (equivalent to 500 mg/kg/day). No teratogenic or fetotoxic effects were observed in laboratory tests in rats and rabbits. However, maternal toxicity, as evidenced by increased salivation, occurred in rats at a dose of 1,000 mg/kg/day; the maternal (NOEL) was 300 mg/kg/day (EPA, 1985). No information was available on carcinogenicity testing for imazapyr; however, the results of gene mutation, chromosomal aberration, and DNA damage tests were all negative (American Cyanamid, 1986).

Lead

EPA's reference dose workgroup concluded that it was inappropriate to develop a reference dose, or an acceptable daily intake, for lead because some of lead's adverse effects, particularly changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may occur at blood lead levels so low as to be essentially without a threshold (EPA, 1991a).

EPA (1991a) has classified lead as a probable human carcinogen (Class B1). Ten rat bioassays and one mouse assay have shown statistically significant increases in renal tumors from dietary and subcutaneous exposure to several soluble lead salts. Epidemiology studies of humans exposed to lead in an occupational setting have proven inconclusive (EPA, 1991a). Two studies did not find any association between lead exposure and cancer mortality. A retrospective cohort study found apparent excesses for respiratory and kidney cancer. Another cohort study found statistically significant increases for total cancer mortality, stomach cancer, and lung cancer in battery plant workers. EPA (1991a) has not determined a cancer slope factor for lead and stated that

"quantifying lead's cancer risk involves many uncertainties, some of which may be unique to lead. Age, health, nutritional state, body burden, and exposure duration influence the absorption, release, and excretion of lead. It is also felt that current knowledge of lead pharmacokinetics indicates that an estimate derived by standard procedures would not truly describe the potential risk."

Inhalation and oral ingestion are the most common routes of exposure to lead. Doses resulting from inhalation exposure to lead depend on the size of the lead particles. Although only a small fraction of particles greater than 0.5 micrometers in diameter are retained in the lungs, they may be cleared from the respiratory tract and swallowed and enter the gastrointestinal tract. Particles retained in the alveoli of the lungs are absorbed efficiently (Klaassen et al., 1986).

Lead poisoning is cumulative, and the toxic effects are severe. Chronic lead exposure in an occupational setting may result in peripheral neuropathy and chronic nephropathy. Lead poisoning may also cause hematological effects, including a shortened erythrocyte lifespan and impairment of heme synthesis. Chronic lead poisoning has been divided into three basic types: alimentary, neuromuscular, and cerebral (Gosselin et al., 1984). Alimentary lead toxicity is characterized by anorexia, a metallic taste in the mouth, constipation, and severe abdominal cramps. Neuromuscular lead toxicity consists of peripheral neuritis, which is usually painless and limited to the extensor muscles; wrist drop is a characteristic symptom. Weakness, paralysis, muscular wasting, arthralgia, and myalgia may occur. Cerebral lead poisoning, or lead encephalopathy, is most commonly found in children and is manifested as headaches, insomnia, persistent vomiting, irritability, delirium, convulsions, and coma.

Laboratory studies have demonstrated that severe lead toxicity can cause sterility, abortion, and neonatal morbidity and mortality (Klaassen et al., 1986). It is also toxic to gametocytes in males and females. Lead is teratogenic in laboratory animals (Gosselin et al., 1984).

Mercury

Humans exposed to mercury vapors during work in the fur, felt, and hat industries demonstrate increased excitability, tremors, and gingivitis as common initial symptoms of overexposure (Klaassen et al., 1986). If elevated exposures continue or increase, signs of neurotoxicity increase, including personality changes, memory loss, severe depression, delirium, and hallucination. However, the kidneys eventually accumulate the greatest share of the total mercury content (Gosselin et al., 1984).

Liquid mercury is absorbed across intact skin, but no quantitative estimates are available of the rate at which this occurs (Gosselin et al., 1984). In most cases attributed to dermal exposure, inhalation toxicity cannot be ruled out as the major exposure route.

ACGIH (1989) has set a threshold limit value of 0.1 mg/m^3 as a time-weighted, average air concentration for exposure to inorganic mercury compounds for a normal 8-hour

workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. Mercury vapor readily diffuses across the alveolar membrane of the lungs (Klaassen et al., 1986).

Renal tumors were noted in a long-term rat feeding study. However, EPA (1991a) stated that there are inadequate data to evaluate the carcinogenicity of mercury.

Mercury is neurotoxic. Most rats fed 30 ppm of methyl mercury chloride in the diet died from neurotoxicity by week 26 of the study (EPA, 1991a). No information on reproductive toxicity was available.

Prometon (Pramitol)

No information is available on human exposures to prometon. Although no studies are available on the dermal absorption rate of prometon, USDA (1984) assumed a dermal penetration rate of 10 percent when no data were available, on the basis of observed rates of dermal exposure for various herbicides. Inhalation exposure to Pramitol® 25E may cause respiratory tract irritation and central nervous system depression, resulting in headache, dizziness, blurred vision, or nausea (Ciba-Geigy, 1982, 1989). No information is available on the carcinogenic potential of prometon. EPA (1992) has set an oral reference dose, or acceptable daily intake level, of 0.015 mg/kg/day, based on a study in laboratory rats in which no adverse effects were observed at the highest dose tested of 15 mg/kg/day. In other laboratory animal studies with prometon, decreased weight gain was commonly observed (EPA, 1992). No reproductive or developmental effects have been reported.

Pyrethrum (MicroGen)

Chrysanthemum, or pyrethrum, flowers contain a mixture of six insecticidal esters, known as pyrethrins. Although pyrethrum is considered to be practically nontoxic to humans, the individual pyrethrins may be moderately to very toxic (Gosselin et al., 1984). Asthma-like attacks, anaphylactic reactions, and peripheral vascular collapse have been reported as a result of the allergenic nature of pyrethrum reactions in humans (Amdur et al., 1991).

Pyrethrum has been reported to cause contact dermatitis in humans, with effects ranging from localized redness and swelling to severe vesicular eruptions (Amdur et al., 1991). Natural pyrethrins are not significantly absorbed through the skin; no toxic effects were observed in rabbits receiving dermal doses as high as 1,500 mg/kg (Gosselin et al., 1984).

As with the dermal route of exposure, inhalation of pyrethrum may cause allergic reactions, particularly in persons who are allergic to ragweed pollen (Gosselin et al., 1984). The American Conference of Governmental Industrial Hygienists has set a threshold limit value of 5 mg/m^3 as a time-weighted, average air concentration for pyrethrum exposure for a normal 8-hour work day and a 40-hour work week, to which nearly all workers may be repeatedly exposed without adverse effects (ACGIH, 1991).

In general, the symptoms of pyrethrum toxicity fall into one of two categories, depending on the presence or absence of an α-cyano substituent on the specific ester. Type I poisoning occurs upon exposure to pyrethrin compounds without this substituent and is characterized in laboratory mammals by sparring and aggressive behavior, enhanced startle response, whole body tremor, and prostration (Amdur et al., 1991). Type II syndrome, caused by pyrethrins that contain the α-cyano substituent, includes symptoms such as burrowing behavior, coarse tremors, clonic seizures, sinuous writhing, and excessive salivation (Amdur et al., 1991).

Available information indicates that pyrethrins are not carcinogens (Casida, 1980).

Sodium Chromate

Trivalent chromium, or chromium(III), is an essential human nutrient in trace amounts (Klaassen et al., 1986). Known harmful effects have been attributed to the hexavalent form, chromium(VI). The major acute effect from ingested chromium is acute renal tubular necrosis. EPA (1991a) reported that no adverse systemic effects were observed in a family who drank for 3 years from a private well containing chromium(VI) of approximately 1 mg/L, resulting in calculated doses of 0.03 mg/kg/day for a 70-kg human. However, chromium(VI) is a known human carcinogen; see discussion below.

Chromium(VI) is corrosive and causes chronic ulceration and perforation of the nasal septum. It also causes ulceration of skin and allergic hypersensitivity (Klaassen et al., 1986).

ACGIH (1989) has set a threshold limit value of 0.05 mg/m^3 as a time-weighted, average air concentration for exposure to soluble chromium(VI) for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse systemic effects. Chronic inhalation of dust or air containing chromium(VI) may cause respiratory problems, including perforated or ulcerated nasal septa and decreased spirometric values (EPA, 1987b).

Chromium(VI) is a known human carcinogen by the inhalation route, with consistent results across investigators and study populations in occupational exposure studies (EPA, 1991a). Dose-response relationships have been established for chromium exposure and lung cancer. EPA (1991b) calculated a cancer slope factor of 41 per mg/kg/day.

EPA (1991a) has set an oral reference dose, or acceptable daily intake level, for humans of 0.005 mg/kg/day for soluble salts of chromium(VI). This is based on a 1-year study in which rats had no adverse effects at a dose of 2.4 mg/kg/day, the highest dose tested. EPA (1991a) stated that the literature available on possible fetal damage caused by chromium compounds is limited, and that no studies are available investigating teratogenic effects resulting from ingestion of chromium compounds.

APPENDIX D

APPENDIX D

SOCIOECONOMIC TABLES

Table D-1
Total Enrollment and Whiteman AFB Students,
Knob Noster and Warrensburg Schools, 1987-1992

	1987-88	1991-92	Percent Change	
			Total	Average/yr.
Knob Noster				
Total Enrollment	1,692	1,871	10.6%	2.5%
Non-Whiteman AFB enrollment	447	530	18.6%	4.3%
Whiteman AFB students	1,245	1,341	7.7%	1.9%
Whiteman AFB as percent of total	73.6%	71.7%		
Whiteman AFB Category A (on-base)	882	903	2.4%	0.6%
Whiteman AFB Category B (off-base)	363	438	20.7%	4.8%
Category B as percent of Total	21.5%	23.4%		
Warrensburg				
Total Enrollment	2,358	2,617	11.0%	2.6%
Non-Whiteman AFB enrollment	2,018	2,143	6.2%	1.5%
Whiteman AFB (all Category B)	340	474	39.4%	8.7%
Whiteman AFB as percent of total	16.8%	18.1%		

Source: Knob Noster and Warrensburg School Districts, 1992.

Table D-2 City of Knob Noster Expenditure and Revenue Trends			
	FY 1986	FY 1988	FY 1990
Expenditures			
Government (Administration)	$48,955.00	$113,247.00	$86,294.00
Police (Public Safety)	$130,042.00	$161,393.00	$210,848.00
Fire	$15,582.00	$24,545.00	$20,332.00
Streets (Public Works)	$121,805.00	$95,841.00	$139,515.00
Debt Service	$0.00	$0.00	$0.00
Other	$85,063.00	$0.00	$0.00
Total	$401,447.00	$395,026.00	$456,989.00
Revenues			
Property (Ad Valorem) Tax	$63,209.00	$74,051.00	$48,697.00
General Sales Tax	$83,965.00	$93,846.00	$108,356.00
Transportation Sales Tax	$0.00	$43,559.00	$49,429.00
Franchise Tax	$58,096.00	$72,839.00	$74,853.00
Miscellaneous Taxes	$52,934.00	$61,956.00	$63,540.00
Intergovernmental - Federal	$61,125.00	$0.00	$0.00
Intergovernmental - State	$11,491.00	$3,359.00	$0.00
Other	$76,781.00	$82,611.00	$87,806.00
Total	$407,601.00	$432,221.00	$432,681.00
Operating Budget Cash Flow	$6,154.00	$37,195.00	($24,308.00)
Utility Net Cash Flow	$55,192.00	$9,912.00	$61,991.00
Source: Fiscal Impact Analysis, Whiteman AFB, FY 1986 and FY 1988; Logistics Management Institute, 1989; FY 1990 Whiteman Area Steering Council.			

Table D-3 City of Warrensburg Expenditure and Revenue Trends			
	FY 1986	FY 1988	FY 1990
Expenditures			
General Government	$249,703.00	$265,312.00	$376,000.00
Public Safety	$888,271.00	$969,949.00	$1,110,000.00
Public Works	$347,291.00	$527,498.00	$463,000.00
Parks and Recreation	$254,119.00	$297,365.00	$366,000.00
Debt Service	$0.00	$0.00	$0.00
Other	$267,929.00	$251,927.00	$334,000.00
Total	$2,007,313.00	$2,312,051.00	$2,649,000.00
Revenues			
Property Tax	$215,062.00	$258,143.00	$268,000.00
Sales Tax	$927,104.00	$1,028,200.00	$1,095,000.00
Franchise Tax	$738,716.00	$764,354.00	$806,000.00
Miscellaneous Taxes	$44,989.00	$48,570.00	$65,000.00
Fines, Fees, and Forfeitures	$151,763.00	$141,440.00	$146,000.00
Intergovernmental - State	$157,784.00	$276,158.00	$288,000.00
Intergovernmental - Federal	$220,888.00	$0.00	$0.00
Interest	$323,982.00	$329,982.00	$226,000.00
Other	$194,498.00	$238,959.00	$207,000.00
Total	$2,974,786.00	$3,085,806.00	$3,101,000.00
Operating Budget Cash Flow	$967,473.00	$773,755.00	$452,000.00
Utility Net Cash Flow	($91,697.00)	($115,658.00)	$11,000.00

Source: Fiscal Impact Analysis, Whiteman AFB, FY86, FY88, and forecasted 1990. Logistics Management Institute, 1989.

Table D-4 City of La Monte Expenditure and Revenue Trends			
	FY 1985	FY 1988	FY 1990
Expenditures			
Personnel	$61,039.00	$49,497.00	$55,000.00
Insurance	$9,227.00	$8,665.00	$12,000.00
Public Safety	$13,756.00	$13,489.00	$18,000.00
Streets	$22,643.00	$13,663.00	$19,000.00
Refuse Disposal	$10,836.00	$15,148.00	$18,000.00
Debt Service	$0.00	$0.00	$0.00
Other	$23,262.00	$17,628.00	$21,000.00
Total	$140,763.00	$118,090.00	$143,000.00
Revenues			
Property Tax	$28,685.00	$24,108.00	$26,000.00
General Sales Tax	$25,004.00	$27,569.00	$29,000.00
Franchise Tax	$23,066.00	$26,326.00	$26,000.00
Miscellaneous Taxes	$9,336.00	$15,594.00	$14,000.00
Permits, Fees, Licenses	$15,413.00	$23,483.00	$26,000.00
Intergovernmental - Federal	$15,113.00	$0.00	$0.00
Intergovernmental - State	$0.00	$0.00	$0.00
Other	$28,297.00	$21,550.00	$23,000.00
Total	$144,914.00	$138,630.00	$144,000.00
Operating Budget Cash Flow	$4,151.00	$20,540.00	$1,000.00
Utility Cash Flow	($929.00)	($37,950.00)	($41,000.00)

Source: Fiscal Impact Analysis, Whiteman AFB, FY86, FY88 and forecasted 1990. Logistics Management Institute, 1989.

Table D-5 City of Windsor Expenditure and Revenue Trends			
	FY 1986	FY 1988	FY 1990
Expenditures			
General Government	$109,947.00	$87,233.00	$93,000.00
Public Safety	$154,106.00	$136,586.00	$159,000.00
Public Works	$226,924.00	$165,624.00	$192,000.00
Culture and Recreation	$51,338.00	$54,969.00	$58,000.00
Debt Service	$41,690.00	$12,892.00	$0.00
Other	$0.00	$0.00	$0.00
Total	$584,005.00	$457,304.00	$502,000.00
Revenues			
Property Taxes	$178,677.00	$160,623.00	$171,000.00
City Sales Tax	$130,202.00	$135,523.00	$143,000.00
Franchise Tax	$70,007.00	$73,279.00	$78,000.00
Miscellaneous Taxes	$62,868.00	$78,976.00	$81,000.00
Intergovernmental - Federal	$64,017.00	$0.00	$0.00
Intergovernmental - State	$0.00	$0.00	$0.00
Interest	$41,750.00	$17,044.00	$15,000.00
Other	$74,931.00	$67,435.00	$75,000.00
Total	$622,452.00	$532,880.00	$563,000.00
Operating Budget Cash Flow	$38,447.00	$75,576.00	$61,000.00
Utility Budget	$11,662.00	$1,353.00	($3,000.00)

Source: Fiscal Impact Analysis, Whiteman AFB, FY86, FY88 and forecasted 1990. Logistics Management Institute, 1989.

Table D-6 City of Sedalia Expenditure and Revenue Trends			
	FY 1986	**FY 1988**	**FY 1990**
Expenditures			
General Government	$791,129.00	$772,768.00	$878,000.00
Police	$1,202,598.00	$1,315,507.00	$1,481,000.00
Fire	$871,397.00	$1,101,789.00	$1,127,000.00
Streets and Highways	$1,374,716.00	$1,554,006.00	$1,653,000.00
Other Public Works	$568,601.00	$677,761.00	$712,000.00
Culture and Recreation	$745,850.00	$702,163.00	$730,000.00
Debt Service	$186,929.00	$0.00	$0.00
Other	$381,257.00	$440,533.00	$492,000.00
Total	$6,122,477.00	$6,564,527.00	$7,073,000.00
Revenues			
Property (Ad Valorem) Tax	$1,055,012.00	$971,430.00	$1,029,000.00
Sales Tax	$1,945,115.00	$2,120,415.00	$2,219,000.00
Transportation Sales Tax	$0.00	$961,589.00	$1,028,000.00
Franchise Tax	$907,818.00	$971,865.00	$972,000.00
Miscellaneous Taxes	$555,887.00	$836,892.00	$709,000.00
Licenses and Permits	$334,564.00	$265,127.00	$181,000.00
Charges for Services	$507,131.00	$575,793.00	$614,000.00
Intergovernmental - Federal	$487,571.00	$682,987.00	$775,000.00
Intergovernmental - State	$8,348.00	$8,447.00	$9,000.00
Other	$353,104.00	$375,926.00	$281,000.00
Total	$6,154,550.00	$7,770,471.00	$7,817,000.00
Operating Budget Cash Flow	$32,073.00	$1,205,944.00	$744,000.00
Utility Net Cash Flow	($165,666.00)	($243,625.00)	($84,000.00)

Source: Fiscal Impact Analysis, Whiteman AFB, FY86, FY88 and forecasted 1990. Logistics Management Institute, 1989.

Table D-7 Cumulative Personnel Changes at Whiteman AFB (MM II, B-2, Tenant)										
Category	**FY91 Base**	**Base Personnel Changes (as of end of fiscal year)**								**FY98 Base**
		FY92	**FY93**	**FY94**	**FY95**	**FY96**	**FY97**	**FY98**	**Total**	
Enlisted	2,549	351	419	-97	-497	145	255	70	646	3,195
Officers	425	56	-9	-68	-121	17	26	10	-89	336
Total Military	**2,974**	**407**	**410**	**-165**	**-618**	**162**	**281**	**80**	**557**	**3,531**
Civilian	374	26	22	3	24	1	0	0	76	450
TOTAL	**3,348**	**433**	**432**	**-162**	**-594**	**163**	**281**	**80**	**633**	**3,981***

*Does not include retirements and/or other permanent changes of station (PCSs).

Source: HQ SAC/XPM, 1991.

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APPENDIX E

APPENDIX E

SAFETY CONSIDERATIONS

An evaluation of the deactivation of the Minuteman (MM) II system at Whiteman AFB, MO, has identified overall insignificant, if not negligible, effects about the safety of handling, transporting, and storing missile components. This appendix describes the safety programs the Air Force uses to reasonably ensure that the probability of the accidents described in the following sections is remote. A wide range of accident scenarios is possible; some of the more severe accident scenarios are analyzed in terms of potential environmental impacts. It is highly unlikely that any of these accident scenarios would occur.

Removing missiles from their launch tubes and transporting them to storage or elimination facilities poses a low likelihood of accidents during transportation, with an even lower chance that such accidents could damage public health or the physical environment. Movement of missile components are performed according to safety standards and procedures, and weapons are regularly inspected, as described in section 3.7.1.

The Air Combat Command (ACC) is responsible for all missile components, i.e., reentry vehicles (RV), missile guidance sets (MGS), and boosters, while they are in the deployment area or at the missile support base (MSB). When RVs are scheduled for retirement, they are shipped to Department of Energy (DOE) facilities. If DOE transportation is backlogged, some of the RVs slated for retirement could be shipped by the Air Force to the DOE holding area. If they are shipped by DOE, they are DOE's responsibility when they leave the MSB. If they are shipped by the Air Force, they are the Air Force's responsibility until they arrive at DOE facilities (HQ SAC/LGWR, 1991). DOE is responsible for manufacturing, transporting, and retiring nuclear weapons when they are no longer in the Air Force's custody. The impacts of reentry vehicle retirement have been assessed in other documents, including the Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (U.S. Department of Energy, 1977), and the Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy, 1983). The findings of these documents are incorporated into this EIS by reference according to 40 CFR 1502.21. These documents evaluated the impacts of nuclear weapon component production and the assembly, maintenance, and decommissioning of RVs. The final environmental impact statement for the Pantex plant concluded that there have not been any direct measurable effects on the health and safety of the general public and no significant impacts to the environment or to the health and safety of the general public are expected to occur; the plant will continue to operate according to DOE standards.

The Air Force Materiel Command (AFMC) is responsible for shipping MGSs from the MSB to various locations. Some of the MGSs will be retired; these will be shipped to an AFMC facility. Some MGSs will be reused within the MM II system; these will be stored

at an AFMC facility until they are needed. Some of the MGSs would be used for another Air Force program, the Reentry System Launch Program. AFMC is also responsible for shipping the boosters from the MSB to AFMC facilities at Ogden Air Logistic Center, Hill AFB.

Propellant Safety

The Air Force has stringent requirements for transporting rocket motors (see section 3.7.1). The issue of the potential risks of rocket motor transport has been evaluated in several environmental documents prepared to evaluate the potential environmental impacts of various Air Force missile programs (USAF, 1986; USAF 1987; USAF, 1989). An environmental assessment (EA) has been prepared (USAF, 1991a) that evaluates, among other MM II rocket motor transport and disposition issues, the potential impacts of an accident involving propellant ignition. Based on the results of this EA, a finding of no significant impact (FONSI) was signed. The findings of the MM II rocket motor EA and the other mentioned environmental documents are incorporated by reference (per 40 CFR 1502.21) into the EA. The following text summarizes the results of the aforementioned studies.

Accidental ignition of a booster caused by static discharge, lightning, impact, or a fire or explosion could cause the propellant to burn so rapidly that it has some partial explosive effect. If a transportation accident occurred in which a missile motor ignited, the following may result: fire and heat; an explosive blast; a propulsion of the rocket motor; and toxic emissions. The major emissions for MM II rocket motors include aluminum oxide (Al_2O_3), nitrogen (N_2), carbon monoxide (CO), carbon dioxide (CO_2), hydrochloric acid (HCl), and water (H_2O). The severity of human health consequences could depend on the proximity to and number of people exposed. Similarly, environmental damage, such as damage to crops or other vegetation, would depend on the nature and proximity of such resources.

If an ignition accident occurred, the dispersion of toxic emissions is likely the main consequence that could be experienced outside of the immediate vicinity (i.e., a few hundred feet if the motor does not exit from the vehicle) of the accident site. If this unlikely event occurred in a populated area, then as many as several thousand individuals could be exposed, for a few minutes to approximately one-half hour, to concentrations of HCl not generally considered to pose a risk to human health. A few individuals could experience eye, respiratory tract, and skin irritation. In an open environment where accidental ignition would occur, the carbon monoxide readily combines with oxygen to form CO_2, and CO levels would not exceed health standards.

An even more extreme case is conceivable; that is, an accidental ignition during a rainstorm. (Water cannot be used to extinguish a propellant fire). While modeling data for such a scenario are not available, the emissions could likely be less dispersed and could reach ground level at higher concentrations than in clear weather. However, the scrubbing effect of the rain could eventually reduce the gaseous concentrations.

As indicated earlier (section 3.7.1), any transportation accident involving ignition of missile propellant is very unlikely. If such an unlikely event were to occur in rural areas, the location for most of the roads between the MSB and the deployment area, health effects on nearby drivers or residents are far less likely than in an urban setting with higher population densities.

If a motor containing an explosive propellant were to be detonated in an accident (an MM II stage three motor contains class 1.1 propellant and is considered an explosive propellant), the shock wave and heat from the blast could damage vehicles and structures, and injure individuals. An explosion of a booster could scatter debris and propellant up to 700 feet from the blast. Fire could engulf this area and the radiant heat could cause injury up to an additional 200 feet. A shock wave may cause window breakage and other minor damage up to 2100 feet from the blast (USAF, 1991a). Information on the potential combustion products and their dispersion was unavailable for this study. The motor also could ignite and leave the vehicle, breaking away from the protective equipment. While this event is extremely unlikely (based on the Air Force's long history of safe handling of missiles), the potential hazard would be significant.

Moving the missiles to and from the deployment area for maintenance is an ongoing activity. The rate of booster movement would be similar to that incurred in a recent replacement program. Over the long term, the MM II system deactivation would eliminate the limited transportation hazard.

Nuclear Safety

Scenarios evaluating the improbable release of radioactive materials through an accident during transport, or at the launch facility have been evaluated in other EISs that considered potential operations and environmental impacts at and around Whiteman AFB, and other AFBs (USAF, 1986; USAF, 1987; USAF, 1989; USAF, 1991c). For the action described in the studies of Peacekeeper and Small ICBM systems, the RV was transported together with the MGS and booster (from the MSB to the deployment area). For MM II and MM III systems, these components are transported separately, reducing the probability or magnitude of any potential impacts from an accident. Other documents have evaluated the transportation of radioactive materials in various environments: Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes (U.S. Nuclear Regulatory Commission (USNRC), 1977), Shipping Container Response to Severe Highway and Railway Accident Scenarios (U.S. Nuclear Regulatory Commission, 1987), Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (U.S. Department of Energy, 1977), and Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy, 1983).

These documents assessed the risk of transporting radioactive materials ranging from spent nuclear fuel and other industrial applications to radioactive source materials for medical diagnosis and treatment. The Final Environmental Statement on the

Transportation of Radioactive Material by Air and Other Modes concluded that radiation exposure of transport workers and of members of the general public along transportation routes occurs from the normal permissible radiation emitted from packages in transport. The effect of this exposure is believed to be negligible. Examination of the consequences of a major accident and assumed subsequent release of radioactive material indicates that the potential consequences are not severe for most shipments of radioactive material. However, in the unlikely event of a plutonium or polonium release in a densely populated area, the effects could be severe. The Transportation of Radionuclides in Urban Environs: Draft Environmental Assessment (USNRC, 1977) examines four potential sources of radiation exposure: incident-free transport, vehicular accidents, human errors, and hostile acts or sabotage of shipments. The assessment concluded that the risks associated with such transportation are low, although severe accidents in urban areas have the potential for large radiological and economic consequences. Shipping Container Response to Severe Highway and Railway Accident Scenarios (USNRC, 1987) concluded that approximately 99.4 percent of truck accidents and 99.7 percent of rail accidents do not cause significant structural damage to spent fuel casks or significant releases of radioactive material. Other types of containers were not assessed.

A release of radioactive materials during transport would require a series of events, with a very low probability that all of the events necessary for a plutonium release would occur (HQ SAC/LGWR, 1991).

As stated in section 3.7, the probability of an accidental explosive detonation of an RV or release of radioactive materials at an LF is infinitesimal. No accidental release of radioactive materials or detonation has occurred involving handling of an ICBM RV or RS within the deployment area, at the MSB, or enroute between the two areas. In contrast, for commercial transfer of radioactive materials (isotopes for nuclear medicine, industrial products, and nuclear reactor fuel), there were 20 incidents of radioactive material release out of 2,190,000 packages shipped in 1975 (a ratio of approximately 1:100,000)(USNRC, 1977). About two-thirds of the release incidents occurred during truck shipments, and about one-third during air shipments of radioactive material. Of the release incidents that occurred during truck shipments, approximately one-half involved vehicular accidents; the rest were caused by handling accidents or improper packaging. All of the releases that occurred during air shipments were caused by handling accidents, damage by other freight, or improper packaging. No releases of radioactive material were reported as a result of rail shipment of these materials (USNRC, 1977).

The RV, which contains the nuclear warhead, would be handled by trained personnel. The handling procedures and design of the system (as described in section 3.7) were established to prevent a mishap with the nuclear device. The safety design and evaluation criteria for nuclear weapon systems (AFR 122-10) specifies a less than $1 * 10^{-9}$ probability of an unintentional significant nuclear yield (greater than 4 pounds of TNT equivalent) per weapon per stockpile lifetime in normal environments. When probabilities for accidental releases or detonation were calculated, events such as transportation accidents, lightning strikes, earthquakes, or in-silo accidents were

considered abnormal environments (USAF, 1991c). The same regulation specifies a less than $1 * 10^{-6}$ probability of an unintentional significant nuclear yield per weapon per stockpile lifetime in abnormal environments. The RVs and RSs would not be handled in an armed state, reducing the likelihood of inadvertent nuclear detonations (IND).

In June 1990, the House Armed Services Committee chartered a group headed by Dr. Sidney Drell of the Stanford Linear Accelerator Center to evaluate the safety of U.S. nuclear weapons if they are involved in accidents (USAF, 1991c). The specific issues to be addressed were IND and plutonium release (Pu dispersal). The risk of IND or Pu dispersal is defined as the probability and consequences of an event occurring. The probability of an accident or abnormal environment causing an inadvertent nuclear detonation or release of plutonium (Pu) is a combination of the probability of an accident or abnormal environment occurring and the likelihood of the RV's response. Two possible hazardous conditions may arise in a serious accident: a loss of shielding efficiency of the RV or a loss of containment or detonation of the conventional explosives and subsequent dispersal of the radioactive material. The probability of an IND is extremely remote; the physics of a nuclear explosion requires precise timing mechanisms for even a small nuclear yield. Therefore, a nuclear chain reaction can occur only if all of the high explosives are ignited at precisely timed intervals (USDOE, 1983). Therefore, its potential effects are not further discussed. Although the probability of Pu dispersal is negligible, the consequences could be significant in a localized area. The risks of IND or Pu dispersal are believed to be negligible.

The RV remains in a carefully controlled, benign environment site (in the LF or WSA) for most of its deployment time. There is little likelihood of an accident or event introducing an abnormal environment to the RV; therefore, the overall probability of an IND or Pu dispersal is very low. The Drell Commission study (USAF, 1991c) considered accident scenarios for an in-silo event. If the stage three propellant were detonated through an accidental fire, Pu could be dispersed. The probability of an IND is negligible and the likelihood of propellant detonation is low because of the precautions and safeguards in place. The system is grounded for electrical shock and all power to the missile is removed before any maintenance or removal activities occur (HQ SAC/LGBX, 1991). Two other accident scenarios were considered in which Pu dispersal was judged to be likely: an aircraft accident while carrying the RV or projectile penetration of the RV.

Other accident scenarios may not result in Pu dispersal: these include lightning strikes at the MSB and vehicle accidents. Lightning strikes to a loaded reentry vehicle guidance and control (RVG&C) van or at the LF are not likely to result in Pu dispersal (USAF, 1991c). The probabilities of any of these accidents occurring is remote. As previously stated, in approximately 30 years of transporting Minuteman ICBMs, there has never been an incident involving Pu dispersal or IND (USAF, 1989, USAF, 1991c).

Potential Impacts of Plutonium Dispersal

The predicted environmental impacts resulting from an accident would only be significant within the immediate accident area (USAF, 1987; USAF, 1989). The area affected would depend upon the type of accident scenario and the resulting events. If the radioactive materials in the RV were released into the atmosphere as a result of a fire, the extent of dispersion would depend upon meteorological conditions at the time of a mishap. Important factors include wind speed and direction, atmospheric stability (the rate at which air rises or descends within the atmosphere), and the presence or absence of precipitation.

The impact from a potential dispersion of radioactive material depends upon the physical and radiological characteristics of the material released. Warheads contain uranium (U) and weapons-grade plutonium (Pu) of two isotopes: Pu-239 and Pu-241. If these materials were released in an accident, Pu would cause the most serious radiation exposure hazard (USAF, 1989). Pu-241 primarily emits beta particles with a small fraction of gamma rays and alpha particles. Pu-239 emits primarily alpha particles at an intensity of 5 million electron volts, and a small amount of gamma rays. U-238 is primarily an alpha-emitter, with a small amount of gamma radiation. Thus, alpha particles would be the primary radiation exposure hazard from the release of radioactive materials (USAF, 1987; USAF, 1989; Shapiro, 1990).

Alpha particles are composed of two protons and two neutrons; these are emitted by an atomic nucleus during alpha decay. Alpha particles move much slower than beta particles and gamma rays and impart a greater amount of energy to an absorbing medium than beta particles and gamma rays over a much shorter distance (Shapiro, 1990). Alpha particles have a short range, approximately 3.5 centimeters (cm) in air or 44 micrometers (μm) in human skin at 5.0 million electron volts (Piesinger, 1980). Alpha particles emitted by radionuclides cannot penetrate through the dead outer layer of the skin and thus do not constitute an external hazard. They can cause damage only if the alpha-emitting radionuclides are ingested or inhaled and the alpha particles are consequently emitted immediately adjacent to or inside living matter (Shapiro, 1990).

Plutonium oxidizes readily upon warming in moist air (National Council on Radiation Protection (NCRP), 1979). The most common oxide is plutonium dioxide (PuO_2). PuO_2 is generally insoluble in water (USNRC, 1977).

Previous studies (USAF, 1986; USAF, 1987; USAF, 1989) predicted that no significant impacts to ground-water quality could be expected because most of the plutonium released would be in a relatively insoluble form (PuO_2) that would bind to soil particles. Surface water quality could be affected in a limited area from surface water runoff and settling of plutonium particles on surface water. This could pose a limited risk to plants and animals, depending upon the amount and concentration of radioactive material deposited in the surface water (USAF, 1987; USAF, 1989). Plants uptake only a small fraction of Pu when it is present in the soil (USNRC, 1977).

Air quality and biological resources could be adversely affected, especially if the plutonium is dispersed in the atmosphere. Some of the radioactive material could settle on areas where vegetables, fruits, grains, and livestock feed are grown. The affected food would have to be removed and destroyed. The amount of radioactive material reaching humans would likely be small because of the extensive cleanup that would occur after an accident and because of the relative insolubility of the plutonium (USAF, 1989).

Human health impacts could be severe, primarily from inhalation of alpha-emitting radionuclides, within the immediate accident vicinity (USAF, 1986; USAF, 1987; USAF, 1989; NCRP, 1979; Shapiro, 1990). Three important factors influencing the severity of health effects to humans are the distance from the source of radioactive particles , the length of exposure, and the amount and type of shielding from the radioactive particles (Shapiro, 1990). The external exposure of humans (or animals) to a cloud of plutonium would not result in significant health effects (USAF, 1986; USAF, 1987). The effect of beta particles and gamma rays would be small, and alpha particles have a short penetrating range (approximately 44 μm in skin, which is within the layer of dead cells that protect the inner layers of skin). The inhalation or ingestion of alpha-emitting radionuclides would have an adverse effect upon internal body tissues; the most critical, in terms of mortality risk, are bone and bone marrow, lungs, and liver. The amount of plutonium inhaled would depend upon meteorological conditions and the amount and type released. If the wind speed was between 5 and 8 miles per hour, wind direction was constant, release time was approximately 1 hour, and precipitation was negligible, a person located approximately 500 to 1,000 feet downwind of the release site could inhale 0.65 micrograms (μg0 (0.04 μCi) of plutonium (USAF, 1986; USAF, 1987). This is equivalent to the maximum permissible body burden (continual working lifetime dose) of plutonium for occupational exposures (NCRP, 1979).

After inhalation, plutonium is solubilized by body fluids, including blood, and redistributed within the body. It is deposited primarily in the skeleton and liver. However, if the inhaled plutonium is an insoluble form, especially PuO_2, it is retained in the lungs for approximately 1,000 days (NCRP, 1979). Although some studies suggest that the rate of cancer or other harmful effects is increased after significant radiation exposure, it is extremely difficult to determine the risk of cancer throughout an individual's lifetime as a function of dose (NCRP, 1979; Shapiro, 1990). The analysis must consider a minimum latent period, the rate of appearance of cancer with time following the latent period, and the period of time over which the cancers will appear (Shapiro, 1990). While several studies have attempted to model the risk of cancer from various dose levels of radiation exposure (NAS-USNRC, 1980 as cited in Shapiro, 1990), the estimates are believed to be crude. Therefore, the risks of cancer will not be further assessed at this time.

In summary, though the impacts could be severe within the immediate area of an accident involving the release of radioactive materials from an RV, the probability of such a release is extremely low (USAF, 1986; USAF, 1987; USAF, 1989). In approximately 30 years of handling the Minuteman systems, there has never been an

incident involving accidental nuclear detonation or plutonium release. The probabilities of accidents involving IND or Pu dispersal are remote, although the consequences could be locally significant. In conclusion, the risk (probability combined with consequences) of handling and transporting missile components is negligible.

APPENDIX F

APPENDIX F

EXISTING ENVIRONMENTAL CONDITIONS NEAR THE LCFs and LFs

The locations of manmade structures and areas susceptible to effects from Minuteman II system activities were determined by analysis of United States Geological Survey (USGS) topographic maps (7½-minute series), Soil Conservation Service (SCS) soil surveys for the pertinent counties in Missouri, mining operation locations information obtained from the Missouri Department of Natural Resources Division of Geology and Land Survey, and a list of sites on the National Register of Historic Places (NRHP) obtained from the Missouri Department of Natural Resources Historic Preservation Program. Maps showing the location of each launch control facility (LCF) and launch facility (LF) were used to determine the site locations on topographic and soil survey maps to assess the immediate area surrounding the sites.

The assessment of environmental site conditions provided data on the proximity to LFs and LCFs of structures, ponds, reservoirs and other features. The precision of the analysis is estimated at plus or minus 200 feet because of the different scales of maps used. The topographic maps used varied in age. Consequently, some recent developments may have occurred subsequent to the latest revision of the maps. The USGS topographic maps are revised only as needed (usually when economic growth and development occurs in an area). Because this area of western Missouri has had slow, steady growth and has not appreciably changed over the past several decades, about 40 percent of the USGS maps of the deployment area predate 1963. The SCS Soil Surveys provide accurate information on the soils in Missouri, but three (Cooper, Morgan, and Pettis Counties) of the studies consulted are unpublished and are subject to revision.

The tables listed on the following pages depict the existing environmental conditions around each LCF and LF. Although irrigation canals and water wells were identified on the maps, there were no irrigation canals within ½ mile of a site and only one site had water wells (one within ¼ mile and another within ½ mile) in close proximity. The first column on the left (LCF/LF) lists the letter and number of each site. Most of the following columns (except for NHRP-listed sites, mines, and biological areas) list a number/number (e.g., 0/3) designation. The first number signifies the sum total of the listed feature found within a ¼-mile radius of a site; the second number signifies the sum total of the listed feature found within ¼ to ½-mile of a site. For example, across from A-11 and under the "Waterways" column (the second column), the numbers 3/1(P) signify that there were three intermittent streams within a ¼-mile radius of A-11 and one perennial (signified by the "P") stream within a ¼- to ½-mile radius of the site. Those instances when the assessed features were not found within the sample area were defined by "None." A range in distance was defined in some instances (e.g., 1-3 mi. means the site was found within 1 to 3 miles of an LF or LCF). The name of a town or city is listed in the "Structures" column when it is within the designated distance. The

fifth column lists letter codes that denote the name of a soil (the register of soils is after the table). The sixth column (NRHP Listed Sites) only provides general locations of sites because of security concerns. Historic sites and places are listed if they were within 5 miles of an LF or LCF. The seventh column lists all State or U.S. highways, secondary highways, or interstate highways within the designated distances. The eighth column specifies all biological areas within 5 miles of a site (although the main bird and wildlife habitat would be within the biological area, flight paths and forays outside the area could approach the LFs and LCFs), and the last column lists the type of mining operations located within 1 mile of a site. A list of mining abbreviations follows table H-1.

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Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA				
LCF/LF	Waterways	Impoundments	Structures	Soils
A-1	0/3	0/4	0/18 (Elmwood)	HgB
A-2	0/1	1/1	0/5	SiB, HgC
A-3	1/3	2/4	4/11	*ND
A-4	1(P)/0	1/1	3/1	WdB, WfC
A-5	1/1	6/7	0/14	ApC
A-6	1/1	5/9	1/6	MaB
A-7	1/1(P)	0/3	1/13	MhB, HgC
A-8	3/0	1/6	3/6	MaB
A-9	None	1/1	0/1	MnB, MhB
A-10	2/0	0/1	3/7	HgC, MaB
A-11	3/1(P)	1/0	5/(Blackburn)	SiB, SiC
B-1	0/2	1/3	1/11	ApB, MaB
B-2	1/0	3/7	5/14	HgB, ApC
B-3	2(1P)/1	0/3	0/8	WdB, WdC
B-4	1/5	1/2	2/7	PrB
B-5	0/4	1/1	2/2	MaB
B-6	0/3(1P)	1/0	1/2	WkB, BlC
B-7	0/2	1/1	4/10	PeB
B-8	0/3	1/6	4/20+ (Hughesville)	MaB, ApB
B-9	1/3	1/4	1/7	MaB
B-10	0/2	4/5	1/3	MaB
B-11	2/1	2/3	0/4	MaB
C-1	2/1(P)	1/0	2/12	*ND
C-2	2/1	2/0	0/6	*ND
C-3	1/3	2/4	6/10	*ND
C-4	None	2/3	0/7	*ND
C-5	1/3	2/2	3/3	*ND
C-6	0/1(P)	0/3	2/8	*ND
C-7	2/2	2/1	2/5	*ND
C-8	1/1	0/5	0/16+ (Smithton)	MaB
C-9	0/1	0/4	10/21	BlC, PeB
C-10	1/2	0/1	0/5	*ND
C-11	1/1	9/14	1/13	PrC

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA			
NRHP Listed Sites	Highway	Biological Areas	Mining Operations
None	None	None	None
0-5 mi. Archaeological Site	0/1	None	None
None	1/0	1.5 mi. Wildlife Area	SACM
None	None	1.5 mi. Wildlife Area	SG
2.5 mi. Historic Structure	0/1	None	None
None	None	None	None
5.0 mi. Historic Structure	1/0	None	None
None	1/0	None	ACM
5.0 mi. Historic Structure	0/1	None	ACM
None	None	None	ALSQ & ACM
None	None	None	None
None	2/0	2.0 mi. Wildlife Area	None
2-5 mi. Historic Structure	1/0	None	LOQ
None	None	None	AQ
1-5 mi. Archaeological Site	1/1	None	None
None	1/0	None	None
None	1/1	None	None
None	1/0	None	SAQ
0-5 mi. Historic Site	1/0	None	None
0-5 mi. Historic Site	None	None	None
2.5 mi. Historic Structure	0/1	None	None
None	1/0	None	None
0-1 mi. Historic Site, 2-3 mi. Historic Structure	1/0	None	None
2-5 mi. Historic Structure	1/1	None	None
0-3 mi. Archaeol. Site, 3-5 mi. Historic Site	0/1	None	None
0-3 mi. Historic Site	1/0	None	AQ
None	1/0	None	None
None	1/0	None	SAQ
None	0/1	None	None
None	2/0	None	None
None	2/0	None	None
None	0/1	None	None
3 mi. Historic Structure	1/0	None	None

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)				
LCF/LF	Waterways	Impoundments	Facilities	Soils
D-1	1/2	1/1	8/8	Seb
D-2	3(2P)/0	0/1	2/4	GaB, CrB
D-3	2/1(P)	0/3	2/9	*ND
D-4	0/2(1P)	1/2	3/6	CrB
D-5	0/3	0/6	0/10	*ND
D-6	1/0	4/2	2/5	*ND
D-7	3/0	1/3	2/9	*ND
D-8	1/1	2/8	0/5	*ND
D-9	1/3	1/0	3/3	*ND
D-10	1/1	0/1	0/5	*ND
D-11	1/1(P)	1/2	10 (Syracuse)/20	*ND
E-1	1/1	1/0	0/7	FnB
E-2	3(1P)/0	1/3	4/6	BIC
E-3	2/3	None	4/3	*ND
E-4	2/1	1/4	1/6	CdC, BdB
E-5	0/1(P)	0/1	8/2	BdB
E-6	1/1	1/1	2/3	SaB, CdB
E-7	2/0	2/5	0/2	MpB
E-8	1/1	1/4	2/6	HtA, MpB, FnB
E-9	1/0	4/7	6/8	MpB, FnB
E-10	0/4	1/6	4/4	MaB
E-11	1/0	1/4	4/8	PrB
F-1	0/1	2/5	5/6	HtA
F-2	1/2(1P)	4/3	3/2	HtA, HtB
F-3	2/1	1/4	0/2	FnB, MpB
F-4	0/4	1/2	1/6	CdB, HtA
F-5	0/1	2/2	2/16	HtB
F-6	0/2(P)	2/1	0/2	HtA
F-7	1/1	1/5	6/7	CdB, BdB
F-8	0/2(1P)	1/0	5/10	HtB, BaB, BaC
F-9	1/1	3/2	4/6	HtB, DeB
F-10	1/3	4/4	1/6	DeC, HtB
F-11	0/5	1/2	0/5	HtB

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)			
NRHP Listed Sites	Highway	Biological Areas	Mining Operations
None	1/0	1.5 mi. Wildlife Area	Prospect
2 mi. Historic Structure	None	None	Prospect
None	None	None	None
None	None	None	Prospect
None	1/0	None	None
4 mi. Historic Structure	1/0	None	None
3 mi. Historic Structure	1/0	2.3 mi. Wildlife Area	None
None	1/0	None	ACP
None	1/0	0.8 mi. Fish Hatchery	None
None	None	None	None
None	1/1	None	None
None	1/0	None	None
None	1/0	None	None
None	1/1	None	None
None	None	None	None
None	1/0	1 mi. Fish Hatchery	None
None	None	None	None
None	None	None	None
None	1/0	None	None
None	2/0	None	None
None	1/0	None	None
None	1/0	None	None
None	None	None	None
None	2/0	None	None
None	1/0	None	None
None	1/0	None	None
None	None	None	None
None	2/0	None	None
None	0/1	None	None
None	None	1-2 mi. Reservoir, 0.5 mi. Wildlife Area	None
None	None	3 mi. Wildlife Area	None
None	None	None	ACM
None	0/1	None	None

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)				
LCF/LF	Waterways	Impoundments	Facilities	Soils
G-1	0/3	1/2	0/9	HtA
G-2	1/1	0/1	0/2	HtB
G-3	1/1	1/6	2/2	HtA
G-4	1/2	None	1/3	BdB
G-5	0/1	0/1	0/2	BdB
G-6	0/3	None	1/4	BdB
G-7	1/3	None	1/7	BoB
G-8	1/1	0/1	2/3	BdB
G-9	0/2	1/1	2/6	BdB
G-10	1/1	0/1	0/9	BdB
G-11	1/0	3/1	0/16	HtB
H-1	1/1	None	1/3	*ND
H-2	1/2	0/2	1/0	EIC
H-3	1/3(1P)	None	0/3	BcB
H-4	2/1	0/1	0/5	*ND
H-5	2/1	1/1	0/2	*ND
H-6	2/1	0/4	0/2	*ND
H-7	2/3	None	3/3	*ND
H-8	0/2	None	1/8	*ND
H-9	2/2	None	0/3	BaB
H-10	1/2	1/0	0/2	PaA, BdB
H-11	2/1	None	0/1	BdB, PaA
I-1	0/1	2/2	0/8	DeB, SuB
I-2	2/1	3/8	0/4	DeB
I-3	1/1(P)	3/1	4/2	SaB, SaC
I-4	2/2(1P)	2/2	3/1	HtB, DeB
I-5	1/0	1/2	2/6	*ND
I-6	0/1	1/9	0/1	HtB
I-7	1/1	0/1	7/0	HtB
I-8	2/1	1/7	1/5	HtA, HtB
I-9	1/2	2/3	3/8	HtB
I-10	1/4	1/2	0/6	DeB
I-11	2/1	1/4	2/6	BaB, BaC

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)			
NRHP Listed Sites	Highway	Biological Areas	Mining Operations
None	None	None	None
None	1/0	2 mi. Wildlife Area	NACM
None	1/1	None	NACM
None	1/0	None	AM
None	0/1	None	SABP
None	1/0	None	None
None	None	None	None
None	1/0	None	SMS
None	None	None	AMS
None	0/1	None	LCMA
None	None	None	None
None	1/0	None	AQ/AM
None	1/0	None	NACM
None	1/0	None	None
None	1/0	None	None
None	1/0	None	None
None	1/0	None	None
None	1/0	None	None
None	1/0	None	None
None	None	None	None
None	None	None	None
None	1/0	None	None
None	0/1	2.1 mi. Wildlife Area	LALSQ
None	None	None	None
None	None	None	SACMD
None	None	None	LACM
None	1/0	5.0 mi. Wildlife Area	LACM
None	0/1	2.5 mi. Wildlife Area	LACM
None	1/0	4 mi. Reservoir, 2.5 mi. Wildlife Area	None
5 mi. Historic Sites	None	1 mi. Wildlife Area	LACM
None	1/0	0.7 mi. Wetlands, 1.8 mi. Wildlife Area	None
3 mi. Historic District	None	None	None
5 mi. Historic District	0/1	None	None

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)				
LCF/LF	Waterways	Impoundments	Facilities	Soils
J-1	0/2	2/4	3/3	KeB
J-2	2/0	1/4	0/3	NeB, SnC
J-3	1/2	1/7	0/4	BtB, DeB
J-4	1/2	None	1/1	BcC
J-5	1/1	None	0/Rockville	BtB, KeB
J-6	2/2	None	1/2	BdB
J-7	1/1 (P)	None	1/1	BaB, BdB
J-8	None	0/1	2/3	HtA, KeB
J-9	1/3	1/2	2/2	BtB, ErE
J-10	1/3	6/4	1/1	KeB
J-11	2/0	3/5	1/4	KeB
K-1	1/1	2/3	1/3	HtA
K-2	1/1	1/3	1/2	KeB
K-3	1/1	1/3	0/3	KeB
K-4	2/1	2/2	2/1	CoD, KeB
K-5	2/1	4/4	1/5	CaB
K-6	1(P)/3(1P)	1/1	1/2	SuB
K-7	1/2	3/3	0/1	KeB
K-8	0/2 (1P)	0/1	1/2	KeB
K-9	2/1	0/1	1/1	KeB
K-10	1/1	5/9	3/0	KeB, SuB
K-11	0/1	6/9	2/4	KeB
L-1	2/0	1/3	3/2	DeC, SnC
L-2	1/1(P)	2/1	0/5	HaA, KeB
L-3	1/4	None	0/1	DeB, BaC
L-4	1/2(1P)	3/3	2/6	SaB, SaC, SnD
L-5	1/1	1/2	0/6	DeC
L-6	2/1(P)	0/1	0/3	SnD, SuC
L-7	1/2	1/8	0/6	NeB, DeC
L-8	1/3	1/1	3/4	DeB
L-9	2/0	2/12	0/7	KeB
L-10	1/2	3/10	0/12	KeC, OsC, SrD
L-11	0/3(P)	1/3	0/1	KeB, KeC

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)			
NRHP Listed Sites	Highways	Biological Areas	Mining Operations
None	1/0	None	None
None	None	None	LALSQ & LACM
None	1/0	None	Cs
None	0/1	None	Cm
2-10 mi. Archaeological Site	None	None	None
None	None	None	ACm
None	1/0	None	None
None	1/0	None	ASG,CS
None	None	None	None
None	1/0	None	ALSQ
None	None	None	None
None	None	None	None
None	None	None	None
None	1/0	None	None
None	None	None	None
0-5 mi. Archaeological Site	1/0	None	None
None	1/0	None	None
None	None	None	LSQ
None	None	None	ACM
None	None	None	ALSQ
None	1/0	None	None
None	1/0	None	None
None	None	None	None
3.5 mi. Historical Structure	1/0	None	None
None	None	None	None
None	None	None	None
None	None	None	None
None	1/0	None	ALSQ
None	None	None	ALSQ
None	None	None	None
None	None	None	None
None	None	None	LSQ
None	1/0	None	None

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)				
LCF/LF	Waterways	Impoundments	Facilities	Soils
M-1	1/2	5/3	2/6	SaB
M-2	1/2	4/14	2/8	MaB
M-3	1/1	1/1	3/2	BaC, WdB
M-4	2/2	1/6	0/4	PoB, SaC
M-5	1/1(P)	1/1	2/7	SaB, SaC, DeB
M-6	1/2	0/3	4/10	DeB, SaC, PoC
M-7	1/1	2/6	6(1 school)/2	DeC, HaA, SaB
M-8	1/3(1P)	2/3	2/5	HaA, SaC
M-9	1/3	0/4	0/4	HaA
M-10	2/1	7/12	2/12	SaC, MaB
M-11	0/2	1/14	0/12	SaC, MaB
N-1	1/2(P)	3/2	2/0	WfB
N-2	1/1	1/3	0/12(1 school)	MhB, MaB
N-3	0/1(P)	1/0	2/2	MhB
N-4	0/1	1/1	6/7	MaB, HgC
N-5	1/0	0/4	1/18	MhB
N-6	1/4	4/9	2/6	MhB
N-7	0/2	5/8	1/6	MaB
N-8	1/3	2/8	1/5	MaB, DeC
N-9	1/4(1P)	3/4	3/2	MaB, SaC, MdC
N-10	1/2	4/3	4/5	WfC, WfB
N-11	1/1	0/2	8/11	MhB, HgC
O-1	1/1	3/0	Whiteman AFB	HaA
O-2	0/1	4/4	0/5	MaB, DeC
O-3	1/3	5/3	0/7	HaA, SaB
O-4	2/2(1P)	1/6	0/6	PrB
O-5	1/3	3/11	3/4	MaB, ApB
O-6	3(1P)/0	0/2	4/1	ApB, GrB
O-7	2/1	2/6	0/8	HtA, HtB
O-8	2/2	2/3	3/10	HtA, HtB
O-9	1/1	2/5	1/7	MdC, NoD
O-10	0/2	3/4	1/4	DeC, MaB, MdC
O-11	1/2	5/3	0/1	MaB

Table F-1. EXISTING ENVIRONMENTAL CONDITIONS AT FACILITIES IN THE DEPLOYMENT AREA (Continued)			
NRHP Listed Sites	Highway	Biological Areas	Mining Operations
None	None	None	ALSQ
None	None	None	None
4.0 mi. Historic Structure	1/0	None	None
None	None	None	None
4.5 mi. Historic District	None	None	LSQ
None	1/0	None	LSQ
None	1/0	None	None
None	None	None	None
None	1/0	None	None
None	1/0	None	LSQ
None	1/0	None	SALSQ
None	0/1	None	None
None	1/2	None	None
3.5 mi. Historic Structure	2/0	None	None
1.5 mi. Historic District	1/0	None	Cs
None	1/0	None	None
None	0/1	None	None
None	0/1	None	LsQ
None	None	None	None
None	None	None	None
None	None	None	None
None	1/0	None	SAQ
2-3 mi. Historic Site	None	None	SACM
None	2/0	None	None
None	1/0	None	None
None	None	None	None
None	1/0	None	None
None	1/0	None	ALSQ
None	0/1	None	None
None	None	None	None
2-3 mi. Historic Area	None	None	None
None	None	None	SACS
None	1/0	None	SAQ

SOIL ABBREVIATIONS

*ND	No data available		
ApB	Arispe silt loam, 2-5% slope	ApC	Arispe silt loam, 4-9% slope
BaB	Barco loam, 2-5% slope	BaC	Barco loam, 5-10% slope
BcB	Barco fine sandy loam, 2-5% slope	BcC	Barco fine sandy loam, 5-9% slope
BdB	Barden silt loam, 1-5% slope		
BtB	Bates loam, 2-5% slope		
BIC	Bluelick silt loam, 5-9% slope		
BoB	Bolivar fine sandy loam, 2-5% slope		
CaB	Catoosa silt loam, 2-5% slope		
CoD	Coweta loam, 5-14% slope		
CrB	Craig silt loam, 3-7% slope		
CdB	Creldon silt loam, 1-5% slope:	CdC	Creldon silt loam, 5-9% slope
DeB	Deepwater silt loam, 2-5% slope	DeC	Deepwater silt loam, 5-9% slope
EIC	Eldorado cherty silt loam, 3-9% slope		
ErE	Eram silt loam, Balltown very flaggy silt loam, 5-20% slope		
FnB	Friendly silt loam, 1-3% slope		
GaB	Gasconade stony silty clay, 2-10% slope		
GrB	Greenton silt loam, 2-5% slope		
HaA	Haig silt loam, 0-2% slope		
HtA	Hartwell silt loam, 0-2% slope	HtB	Hartwell silt loam, 1-3% slope
HgB	Higginsville silt loam, 2-5% slope	HgC	Higginsville silt loam 3-9% slope
KeB	Kenoma silt loam, 1-4% slope	KeC	4-7% slope
MaB	Macksburg silt loam, 0-5% slope		
MdC	Mandeville silt loam, 5-9% slope		
MpB	Maplewood silt loam, 2-5% slope		
MhB	Marshall silt loam, 2-5% slope		
MnB	Minden silt loam, 1-5% slope		
NeB	Newtonia silt loam, 1-3%		
NoD	Norris shaly silt loam, 5-14% slope		
OsC	Oska silty clay loam, 5-9% slope		
PaA	Parsons silt loam, 1-3 % slope		
PeB	Pembroke silt loam, 2-5% slope		
PrB	Pershing silt loam, 2-5% slope	PrC	Pershing silt loam, 5-9% slope
PoB	Polo silt loam, 2-5% slope	PoC	Polo silt loam, 5-9% slope
SaB	Sampsel silty clay loam, 2-5% slope	SaC	5-9% slope
SeB	Seymour silt loam, 2-5% slope		
SiB	Sibley silt loam, 2-5% slope,	SiC	Sibley silt loam, 5-9% slope
SnC	Snead silty clay loam, 5-15% slope	SnD	Snead silty clay loam, 7-16% slope
SrD	Snead rock outcrop, 5-14% slope		
SuB	Summit silty clay loam, 2-5% slope	SuC	Summit silty clay loam, 5-9% slope
WkB	Wakenda silt loam, 2-5% slope		
WdB	Weller silt loam, 2-5% slope	WdC	Weller silt loam, 5-9% slope
WfB	Winfield silt loam, 2-5% slope	WfC	Winfield silt loam, 3-9% slope

MINING OPERATION ABBREVIATIONS

ACM	Abandoned Coal Mine
ACP	Abandoned Clay Pit
ALSQ	Abandoned Limestone Quarry
AM	Abandoned Mine
AMS	Abandoned Mine Staff
AQ	Abandoned Quarry
ASCM	Abandoned Small Coal Mine
ASG	Small Abandoned Sand and Gravel Pits
CM	Coal Mine
CS	Coal Shafts
LACM	Large Active Coal Mine
LALSQ	Large Active Limestone Quarry
LCMA	Large Coal Mining Area
LOQ	Large Operating Quarry
LSQ	Limestone Quarry
NACM	Numerous Abandoned Coal Mines in the Area
Prospect	Prospect Pits
SABP	Small Abandoned Barite Pits
SACM	Small Abandoned Coal Mine
SACMD	Small Abandoned Coal Mine Dumps
SACS	Small Abandoned Coal Shaft
SALSQ	Small Abandoned Limestone Quarries
SAQ	Small Abandoned Quarry
SG	Sand and Gravel Pit
SM	Strip Mine
SMS	Small Mine Shaft

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APPENDIX G

LABAT-ANDERSON INCORPORATED
ENVIRONMENTAL SCIENCE AND POLICY, OMAHA OFFICE
1501 J F KENNEDY DRIVE, BELLEVUE, NEBRASKA 68005
FAX (402) 291-2836 (402) 291-2362

November 20, 1991

G. Tracy Mehan III
State Historic Preservation Officer
MO Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Dear Mr. Mehan,

On April 15th of this year, the Secretary of the Air Force announced that the Minuteman II (MM II) Intercontinental Ballistic Missiles (ICBMs) would be retired. Recently, the MM II systems have been taken off full alert status. Minuteman II Missile Wings are located at Whiteman Air Force Base (near Knob Noster, Missouri), Malmstrom AFB (near Great Falls, Montana), and Ellsworth Air Force Base (near Rapid City, South Dakota).

The environmental directorate of Headquarters Strategic Air Command (HQ SAC/DEV) prepared an environmental assessment on the conversion of the MM II system to an MM III system at Malmstrom AFB and an environmental impact statement for the deactivation of the MM II system at Ellsworth AFB. The assessment of potential environmental impacts caused by the proposed deactivation of the MM II system is underway.

In the event that deactivation of the 351st Missile Wing at Whiteman Air Force Base occurs, the 150 missile launch facilities (LFs) within the deployment area in west central Missouri would be deactivated and dismantled. Dismantlement of the LF headworks is anticipated to require the use of explosive demolition techniques. After headworks dismantlement, the launch tube would be filled with rubble and sealed, and the area would be compacted to preclude settlement. The security fence would remain, and the hardstand area would be generally restored to a flat, graveled surface with a positive drainage. The launch control facilities, also referred to as LCFs, (these facilities are manned to enable launching of the missiles) within the deployment area would be disabled through several activities. The elevator to the launch control capsule (LCC) would be removed, and the elevator shaft would be filled with rubble and selected backfill with a reinforced concrete cap to prevent future access to the LCC.

We would appreciate your assistance in gathering data pertinent to the environmental impact analysis process regarding your potential areas of concern. Please review the potential action described above for Whiteman Air Force Base and identify any pertinent concerns regarding the potential impacts of the action.

We are particularly interested in identifying National Register sites and other cultural resources potentially affected by the potential action. A map of the deployment area is enclosed to aid your research.

LABAT-ANDERSON Incorporated is assisting HQ SAC/DEVP in the preparation of this environmental impact statement. If you have any questions, please contact Brian Goss, Project Director, or me at the address and phone number listed on the letterhead.

The Headquarters Strategic Air Command point of contact for this matter is Ms. Julia Cantrell, SAC/DEVP, 901 SAC Boulevard, Suite 3D-2, Offutt AFB, Nebraska 68113-5320, telephone (402) 294-3684.

Sincerely,

LABAT-ANDERSON Incorporated

Christine Berube

Christine Berube
Environmental Analyst

cc: 861R Project Notebook

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Divisionof Parks, Recreation,
and Historic Preservation

DIVISION OF PARKS, RECREATION, AND HISTORIC PRESERVATION
P.O. Box 176
Jefferson City, MO 65102
314-751-2479

January 15, 1992

Mr. Chris Berube
Labat-Anderson Incorporated
Environmental Science and Policy
1501 J.F. Kennedy Drive
Bellevue, Nebraska 88006

RE: Proposed Whiteman Air Force Base Missle Launch Facility Deactivation (SAC/DOD), Knob Noster Vicinity, Missouri

Dear Mr. Berube:

In response to your letter dated 20 November 1991 concerning the above referenced project, the Historic Preservation Program has reviewed the information provided and has determined that since the project area has been previously disturbed, it will not be necessary to conduct a cultural resource survey. Therefore, we have no objections to the initiation of project activities.

However, if the currently defined project area or scope of project related activities is changed or revised, the Missouri Historic Preservation Program must be notified and appropriate information relevant to such changes or revisions be provided for further review and comment in order to ascertain the need for additional investigations.

If I can be of further assistance, please write or call 314/751-7958.

Sincerely,

HISTORIC PRESERVATION PROGRAM

Chris Hansman

Chris Hansman
Acting Senior Archaeologist

mc

c: MaryAnn Naber

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LABAT-ANDERSON INCORPORATED

ENVIRONMENTAL SCIENCE AND POLICY, OMAHA OFFICE

1501 J F KENNEDY DRIVE, BELLEVUE, NEBRASKA 68005

FAX (402) 291-2836 (402) 291-2362

November 20, 1991

Mr. Jerry Brabander
US FWS, Ecological Services
608 E. Cherry
Columbia, Missouri 65201

Dear Mr. Brabander,

On April 15th of this year, the Secretary of the Air Force announced that the Minuteman II (MM II) Intercontinental Ballistic Missiles (ICBMs) would be retired. Recently, the MM II systems have been taken off full alert status. Minuteman II Missile Wings are located at Whiteman Air Force Base (near Knob Noster, Missouri), Malmstrom AFB (near Great Falls, Montana), and Ellsworth Air Force Base (near Rapid City, South Dakota).

The environmental directorate of Headquarters Strategic Air Command (HQ SAC/DEV) prepared an environmental assessment on the conversion of the MM II system to an MM III system at Malmstrom AFB and an environmental impact statement for the deactivation of the MM II system at Ellsworth AFB. The assessment of potential environmental impacts caused by the proposed deactivation of the MM II system is underway.

In the event that deactivation of the 351st Missile Wing at Whiteman Air Force Base occurs, the 150 missile launch facilities (LFs) within the deployment area in west central Missouri would be deactivated and dismantled. Dismantlement of the LF headworks is anticipated to require the use of explosive demolition techniques. After headworks dismantlement, the launch tube would be filled with rubble and sealed, and the area would be compacted to preclude settlement. The security fence would remain, and the hardstand area would be generally restored to a flat, graveled surface with a positive drainage. The launch control facilities, also referred to as LCFs, (these facilities are manned to enable launching of the missiles) within the deployment area would be disabled through several activities. The elevator to the launch control capsule (LCC) would be removed, and the elevator shaft would be filled with rubble and selected backfill with a reinforced concrete cap to prevent future access to the LCC.

We would appreciate your assistance in gathering data pertinent to the environmental impact analysis process regarding your potential areas of concern. Please review the potential action described above for Whiteman Air Force Base and identify any pertinent concerns regarding the potential impacts of the action.

We are particularly interested in your determination whether any Federal endangered or threatened species, as well as any species currently proposed for protection, that may reside within or migrate through this area. We are also interested in any recently developed recreational areas or any recreational areas planned for the near future within the deployment area (see enclosed map).

LABAT-ANDERSON Incorporated is assisting HQ SAC/DEVP in the preparation of this environmental impact statement. If you have any questions, please contact Brian Goss, Project Director, or me at the address and phone number listed on the letterhead.

The Headquarters Strategic Air Command point of contact for this matter is Ms. Julia Cantrell, SAC/DEVP, 901 SAC Boulevard, Suite 3D-2, Offutt AFB, Nebraska 68113-5320, telephone (402) 294-3684.

Sincerely,

LABAT-ANDERSON Incorporated

Christine Berube

Christine Berube
Environmental Analyst

cc: 861R Project Notebook

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO:

FWS/AFWE-CMFO

JAN 8 1992

Christine Berube
Environmental Analyst
Labat-Anderson Incorporated
Environmental Science and Policy
1501 J.F. Kennedy Drive
Bellevue, Nebraska 68005

Dear Ms. Berube:

This responds to your letter, dated November 20, 1991, requesting the comments of the U.S. Fish and Wildlife Service (Service) on the proposed deactivation of the Minuteman II Intercontinental Ballistic Missiles in southwestern Missouri. There are 150 missile site launch facilities under the direction of the 351st Missile Wing at Whiteman Air Force Base, Knob Noster, Missouri.

These comments are provided as technical assistance and predevelopment consultation and do not constitute a Service report under authority of the Fish and Wildlife Coordination Act (Coordination Act) (16 U.S.C. 661 et seq.) on any required Federal environmental review or permit or license application.

The Service has responsibility, under a number of authorities, for conservation and management of fish and wildlife resources. Chief among the Federal statutes with which our office deals are the Coordination Act, Endangered Species Act, and the National Environmental Policy Act. The Coordination Act requires that fish and wildlife resources be given equal consideration in the planning, implementation, and operation of Federal and federally funded, permitted, or licensed water resource developments. Section 7 of the Endangered Species Act outlines procedures for interagency consultations on the effects of Federal actions on federally-listed threatened and endangered species.

The Service participates in scoping and review of actions significantly affecting the quality of the environment under authority of the National Environmental Policy Act. In addition to these statutes, the Service has authority under several other legislative, regulatory, and executive mandates to promote conservation of fish and wildlife resources for the benefit of the public.

In Missouri, the Service has special concerns for migratory birds (in particular waterfowl), endangered and threatened species, and other important fish and wildlife resources. We also are concerned about impacts to Federal and State wildlife refuges and management areas and other public lands, as well as to other areas that support sensitive habitats. Habitats frequently

associated with important fish and wildlife resources are wetlands, streams, and riparian (streamside) woodlands. Special attention is given to proposed developments that include modification of wetlands, stream alteration, or contamination of important habitats. The Service recommends ways to avoid, minimize, rectify, reduce, or compensate for damaging impacts to important fish and wildlife resources and habitats that may be attributed to land and water resource development proposals.

In accordance with Section 7(c) of the Endangered Species Act, we have determined that the following federally-listed species may occur in the project area. No designated critical habitat occurs in the project area.

Species	Federal Status[1]	Status in Missouri	Habitat
Bald Eagle (*Haliaeetus leucocephalus*)	E	Migrant, winter resident, rare breeder along some of the major rivers in the state	Large lakes & rivers
Peregrine Falcon (*Falco peregrinus*)	E	Rare migrant	Open country near lakes & rivers
Gray bat (*Myotis grisescens*)	E	Scattered throughout the state	Limestone karst caves; forage over water of reservoirs & rivers
Indiana bat (*Myotis sodalis*)	E, DCH	Scattered throughout the state; designated critical habitat in Crawford, Franklin, Iron, Shannon, & Washington Cos.	Limestone karst caves; forage along riparian corridors & forested hill-sides

[1] E- Endangered, T- Threatened, PE- Proposed for listing as Endangered, PT- Proposed for listing as Threatened, DCH- Designated Critical Habitat

Ozark cavefish (Amblyopsis rosae	T	SW corner of the state	Limestone karst caves
Niangua darter (Etheostoma nianguae)	T, DCH	Endemic to Osage R. Basin; designated critical habitat in Camden, Cedar, Dallas, Greene, Hickory, Miller, & St. Clair Cos.	Clear, medium-sized streams with silt-free gravelly or rocky bottoms
Pink mucket pearly mussel (Lampsilis orbiculata)	E	Mainly in Osage and Meramec Rivers	Usually in large rivers in moderate to fast-flowing water
Geocarpon (Geocarpon minimum)	T	Known only from Cedar & Dade Cos.	Channel sandstone outcrops, saline-soil prairies
Mead's milkweed (Asclepias meadii)	T	Barton, Benton, Cass, Dade, Pettis, Polk, St. Clair, & Vernon Cos.	Virgin bluestem prairies
Prairie mole cricket (Gryllotalpa major)	PT	Restricted to SW part of the state	Tall grass prairie

The nature of the subject project indicates that habitat for the species listed above likely would not be adversely affected. If in their final determination, the Air Force finds that the project may affect listed species, formal or informal consultation should be requested with this office. Likewise, should plans for this proposed project be modified, or new information indicate that listed species may be affected, consultation should be reinitiated with this office.

We have reviewed the plans for the proposed project and offer the following comments:

1. The proposed project does not appear to impact Federal fish and wildlife management facilities. We suggest you contact either the Missouri

Department of Conservation (P.O. Box 180, Jefferson City, Missouri 65101) or the Missouri Department of Natural Resources (P.O. Box 176, Jefferson City, Missouri 65102) for information on State managed areas.

2. Construction and operational activities should avoid wetlands, streams, and riparian zones to the maximum extent possible. If impact to these areas is unavoidable, a permit may be required from the U.S. Army Corps of Engineers and/or the Missouri Department of Natural Resources. If a Federal permit is required, the Service would review the application and provide recommendations.

3. We suggest that you contact the Missouri Department of Conservation (P.O. Box 180, Jefferson City, Missouri) concerning State-listed endangered and threatened species.

4. We recommend planting warm season grasses at the abandoned sites rather than restoring a flat graveled surface.

5. Should any of the sites be conducive to restoration or development of wetland habitat, this office would be pleased to provide technical assistance to the Air Force in project design and implementation.

Based upon the submitted information, we have no objection to this proposal as currently planned, provided that our recommendations are followed. However, should the plans be modified, we recommend that you reinitiate coordination with this office.

Should you have questions concerning this response, or if we can be of any further assistance, please contact Rick L. Hansen at the address above, or by telephone at (314)876-1911 or (FTS)276-1911.

Sincerely yours,

Jerry J. Brabander
Field Supervisor

cc: MDC; Jefferson City, MO (Attn: Dan Dickneite)
MDC; Jefferson City, MO (Attn: Dennis Figg)
MDNR; Jefferson City, MO (Attn: Charles Stiefermann)
EPA; Kansas City, KS (Attn: Kathy Mulder)

RLH:rh:1747XCICBMXA

LABAT-ANDERSON INCORPORATED
ENVIRONMENTAL SCIENCE AND POLICY, OMAHA OFFICE
1501 J F KENNEDY DRIVE. BELLEVUE. NEBRASKA 68005
FAX (402) 291-2836 (402) 291-2362

November 20, 1991

Mr. John Smith
MO Department of Conservation/
Columbia Research Office
1110 S. College Avenue
Columbia, MO 65201

Dear Mr. Smith,

On April 15th of this year, the Secretary of the Air Force announced that the Minuteman II (MM II) Intercontinental Ballistic Missiles (ICBMs) would be retired. Recently, the MM II systems have been taken off full alert status. Minuteman II Missile Wings are located at Whiteman Air Force Base (near Knob Noster, Missouri), Malmstrom AFB (near Great Falls, Montana), and Ellsworth Air Force Base (near Rapid City, South Dakota).

The environmental directorate of Headquarters Strategic Air Command (HQ SAC/DEV) prepared an environmental assessment on the conversion of the MM II system to an MM III system at Malmstrom AFB and an environmental impact statement for the deactivation of the MM II system at Ellsworth AFB. The assessment of potential environmental impacts caused by the proposed deactivation of the MM II system is underway.

In the event that deactivation of the 351st Missile Wing at Whiteman Air Force Base occurs, the 150 missile launch facilities (LFs) within the deployment area in west central Missouri would be deactivated and dismantled. Dismantlement of the LF headworks is anticipated to require the use of explosive demolition techniques. After headworks dismantlement, the launch tube would be filled with rubble and sealed, and the area would be compacted to preclude settlement. The security fence would remain, and the hardstand area would be generally restored to a flat, graveled surface with a positive drainage. The launch control facilities, also referred to as LCFs, (these facilities are manned to enable launching of the missiles) within the deployment area would be disabled through several activities. The elevator to the launch control capsule (LCC) would be removed, and the elevator shaft would be filled with rubble and selected backfill with a reinforced concrete cap to prevent future access to the LCC.

We would appreciate your assistance in gathering data pertinent to the environmental impact analysis process regarding your potential areas of concern. Please review the potential action described above for Whiteman Air Force Base and identify any pertinent concerns regarding the potential impacts of the action.

We are particularly interested in your determination whether any state endangered or threatened species, as well as any species currently proposed for protection, may reside within or migrate through this area. We are also interested in any recently developed recreational areas or any recreational areas planned for the near future within the deployment area (see enclosed map). If your department knows of any LFs or LCFs in or within Natural Areas or delineated wetlands, please contact us so that we may ensure the consideration of potential impacts to these sensitive areas.

LABAT-ANDERSON Incorporated is assisting HQ SAC/DEVP in the preparation of this environmental impact statement. If you have any questions, please contact Brian Goss, Project Director, or me at the address and phone number listed on the letterhead.

The Headquarters Strategic Air Command point of contact for this matter is Ms. Julia Cantrell, SAC/DEVP, 901 SAC Boulevard, Suite 3D-2, Offutt AFB, Nebraska 68113-5320, telephone (402) 294-3684.

Sincerely,

LABAT-ANDERSON Incorporated

Christine Berube

Christine Berube
Environmental Analyst

cc: 861R Project Notebook

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS
P.O. Box 180
Jefferson City, Missouri 65102-0180

STREET LOCATION
2901 West Truman Boulevard
Jefferson City, Missouri

Telephone: 314/751-4115
JERRY J. PRESLEY, Director

Season's Greetings

December 26, 1991

Ms. Christine Berube
Environmental Analyst
Labat-Anderson, Inc.
1501 J. F. Kennedy Drive
Bellevue, Nebraska 68005

Re: Minuteman II Sites in Missouri

Dear Ms. Berube:

In response to your request for information on rare and endangered species and sensitive elements that occur in the vicinity of Minuteman II sites in Missouri, we conducted a computer search of the Heritage Database. Because the maps provided did not give specific section, township and range locations, we had difficulty in ascertaining the precise location of missile sites. As an alternative, we utilized the general "Minuteman Deployment Area" map.

The attached sheets contain 33 animal species that are either federally or state listed and over 70 plants of interest. In addition, great blue heron rookery sites and high quality natural community locations are also provided.

While the lists are impressive and provide insight, we doubt that there will be significant impact if the work is conducted within the current missile sites. If plans call for activities outside the missile sites, further evaluation of the impacts might be necessary.

I hope this response meets your needs. If you wish to discuss, don't hesitate to call.

Sincerely,

W. H. Dieffenbach

WILLIAM H. DIEFFENBACH
ASST. PLANNING DIVISION CHIEF

WHD:jct

Enclosure

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APPENDIX H

APPENDIX H

Public Hearing Transcript and Comment Letters and Responses

This appendix contains a list of all commentors, the public hearing testimony, the comment letters received on the draft EIS, and the Air Force response to each comment.

Each comment letter was assigned an identification number, which appears in the upper right-hand corner of the first page of the letter. The transcript was assigned document number "1" and the speakers were assigned a letter. For example, the first commentor at the public hearing is coded "1a".

The reproductions of the coded letters are followed by the responses to the letters. Comment letters were assigned document numbers "2" through "9". Comment letters were placed in order with letters from Federal Agencies being presented first, followed by those from the State of Missouri and local government agencies and private citizens. Comment letters received after the close of the comment period (June 1) were placed after those received during the comment period.

Table H-1
List of Speakers and Commentors on the Draft EIS

	Speakers at Public Hearing
1a	Mr. J. Jeff Hancock, City Administrator of Warrensburg, MO
1b	Mr. Larry Ficken, Assistant Superintendent of Schools, Knob Noster, MO
1c	Mr. Joe Anson, Higginsville, MO
1d	Mrs. Martha Price
1e	Mr. John M. Johnson, Warrensburg, MO
	Commentors
2	United States Environmental Protection Agency, Region VII
3	Missouri Department of Natural Resources
4	Knob Noster Public Schools
5	Sedalia Area Chamber of Commerce Letter on the MM II Deactivation at Whiteman AFB
6	Revised Comments from Sedalia Area Chamber of Commerce
7	United States Department of the Interior, Office of Environmental Affairs
8	Mr. Edwin C. Beard, Knob Noster, Missouri
9	Mr. Virgil R. Coleman, Ms. Goldie Nadine Coleman, Warrensburg, Missouri

DEACTIVATION OF THE MINUTEMAN II MISSILE SYSTEM
AT WHITEMAN AIR FORCE BASE

ORIGINAL

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED, that on Tuesday, May 19th, 1992, at 7:04 p.m. the above-entitled cause came on for public hearing at the Knob Noster Middle school, Knob Noster, Missouri

A P P E A R A N C E S

Presiding Officer:	Colonel Heupel
Members of Hearing the Panel:	Colonel Anarde Major McRae Mr. Brian Goss Mr. George Gauger
Public Speakers:	J. Jeff Hancock Larry Ficken Joe Anson

I N D E X

P R O C E E D I N G S

(Proceedings commenced at 7:04 p.m.)

COLONEL HEUPEL: We're going to go ahead and get started here. It's seven o'clock and I guess military preciseness, we may be a minute or two late, but we'll get on with it, and some people may wonder in and they are welcome to come on in and have a seat.

I want to welcome all of you to the public hearing on the Draft Environmental Impact Statement or EIS, and you'll be hearing that term used quite a bit, EIS, Environmental Impact Statement. This is for the deactivation Minuteman II Missile System at Whiteman Air Force Base.

Now, I invite your comments as well as your involvement in tonight's hearing. I'm Colonel Jim Heupel. I'll serve as the presiding officer for this public hearing.

I'm the Chief Trial Judge for the Air Force. I've come from Washington D.C. I would like to introduce the members of tonight's hearing panel and I'll be

introducing them in the order in which they're seated to my left:

First is Colonel Anarde, the Commander of the 351st Operation Group at Whiteman Air Force Base.

Next to him is Major McRae, who is an ICBM Force Structure Manager.

Next to Major McRae is Mr. Brian Goss, the Project Manager for the Labat-Anderson Incorporated, a contract assisting the Air Force in the preparation of the EIS.

Next to Mr. Goss is Mr. George Gauger, formerly of the Environmental Management Directorate at SAC Headquarter Environmental -- of the Environmental Planning Division of the Air Force Center for Environmental Excellence Headquarters.

Now, Colonel Anarde will make a brief statement on behalf of the 351st Missile Wing. Major McRae will present an overview of the proposed deactivation action. Mr. Goss will then discuss the use of public, oral and written comments during the preparation of the Draft Environmental Impact Statement and Mr. Gauger will present

an overview of the environmental process as it applies to this particular proposed action.

Now, I'm not assigned to Whiteman Air Force Base, as I indicated, and I'm not acting as a legal advisor to the Air Force representatives who will address this action.

I'm not here as an authority on the Draft EIS, and I have not had any involvement with this development.

My purpose here tonight, is to ensure that we have an orderly hearing and that anyone and everyone who wishes to provide input or to make a comment, has a fair opportunity to speak and to be heard.

Now, I would like to briefly explain the public hearing process and the procedures that we'll follow this evening.

In accordance with the National Environmental Policy Act and Air Force Implementing Regulations, the Air Force has prepared a Draft EIS or Environmental Impact Statement, as I said before.

Now, this EIS analyzes the potential

impacts to the biologic, physical and human environment from deactivating the 351st Missile Wing, which operates and maintains the Minuteman II Missile System at Whiteman Air Force Base.

The purpose of this hearing is to receive input on the Draft EIS from elected officials, from public agencies, private and non-private organizations and from interested and concerned citizens.

Now, this hearing provides you a means of communicating with the Air Force decision makers on the potential impacts of the proposed deactivation. The overall objective of the hearing is to improve the decision making process.

Now, there are two parts to this hearing; the first part includes presentation by Air Force representatives detailing the proposed deactivation and then the environmental impact analysis process with the summary of the subsequent findings in the Draft EIS.

The second part of the hearing is for you to provide the Air Force with

information or to make a statement for the record. Your input will provide the decision makers with the benefit of your knowledge of the local area and any environmental affects, adverse or beneficial, that you believe may result from the proposed action.

This public hearing will not be a debate or referendum or vote on the Minuteman II deactivation itself.

Now, with this in mind, I would like to explain just a couple of proceedings we'll follow tonight and then later on in the proceeding, immediately before you speak, I'll go through some of the other procedures.

Our court reporter is recording word for word all things that are said during this hearing. The transcript she prepares will become a part of the final EIS, which in turn becomes part of the Air Force record of decision.

Now when you signed the attendance sheet as you came in, you were also provided with a card to fill out if you wanted to

make a statement or comment tonight. If you do wish to make a statement or comment orally here tonight, it's important for you to be sure to fill one of these cards out because it's going to be from these cards that I will be recognizing members of the public as well as the elected officials for the purpose of making comments.

When we get into the public comment, elected officials will proceed first and then the public at large, and I'll be doing that on a random basis. I'll shuffle the cards up here, if we have several speakers, I'll shuffle the cards up so that everybody has an opportunity; one, to be heard; two an opportunity to be the first speaker.

If you want to speak tonight and you have not filled out a card, just hold up your hand, we'll get a card delivered to you. If you have already filled one out, if you would just hold it up when you've completed it and they'll collect it.

We'll just probably take a ten minute break after the presentation by the Air Force speakers in case you want to just wait

and go up and get a card later on.

Now if you do not make a verbal statement tonight but you would like to provide some written input, you may do so by providing a written statement. Now, there is also a sheet in the back that's available for that or you can just do it by letter format or something more voluminous if you so desire and we'll provide you with the address that you'll need to use to fill that out later on.

The important point for us to make is that your comments, whether they be oral comments here tonight or whether they be written comments submitted today or whether they be written comments submitted by you later on, they'll all be given equal consideration in the record making process.

Now, any written comments must be received by the 1st of June of this year. Now, also, if you do have some written comments with you when you're done speaking, you might turn those in. We certainly would welcome those, and we would just ask you to put your name and your address on them so we

know who they came from.

In summary, I would just like to stress at this point, this is your opportunity to provide the Air Force with any information you may have regarding environmental factors that are unknown to us and to have inputs into the decisions the Air Force must make regarding the deactivation of the Minuteman Missile System at Whiteman.

Let me assure you that your interests is our primary purpose for our being here tonight. I want to thank every one that is here tonight, and I want to thank you for your interest and for your involvement.

At this time, Colonel Anarde will speak briefly on behalf of the 351st Missile Wing.

Colonel Anarde.

COLONEL ANARDE: Thank you. Good evening, ladies and gentlemen.

As mentioned, I'm Colonel Russ Anarde, Commander of the 351st Operations Group.

Let me echo Colonel Heupel's thanks to you for attending the public hearing. The men and the women of the 351st Missile Wing have enjoyed your support for nearly 30

years.

The fact that we have reached a time when we can consider the deactivation of the Minuteman II Missile System at Whiteman Air Force Base, is evidence that together we have done our job very well.

In keeping with this spirit of partnership, we want to make sure that your inputs and your concerns about the environmental impacts of the proposed deactivation are considered because they are important to the final decision.

I want to assure you that whatever the 351st Missile Wing is directed to do, we will perform that mission with safety and security as our watch force, just as they have guided our efforts in the past.

Thank you.

COLONEL HEUPEL: Major Randy McRae will now present an overview of the proposed deactivation.

Major McRae.

MAJOR MCRAE: Thank you, sir. Good evening. My name is Randy McRae. I'm the ICBM Force Structure Manager from

Headquarters SAC.

My presentation tonight will cover the background that led to the proposed deactivation. I'll briefly describe the missile wing operation. I'll describe the proposed retirement, taking you through each of the three major phases of that process and I will conclude by showing you the proposed deactivation schedule, should a decision reflect the go ahead with the deactivation.

In February of 1991, the Secretary of Defense announced that we would begin retirement of the older systems in response to a changing world environment and a declining defense budget.

Specifically, the Secretary announced that we would begin retirement of the Minuteman II Weapon System in fiscal year 1992.

On April 15th, 1991, the Secretary of the Air Force announced that the 351st Missile Wing at Whiteman Air Force Base would become retirement of its 150 Minuteman II intercontinental ballistic missiles or

ICBM beginning in late 1993.

Then on September 27th, 1991, President Bush called for the immediate standdown of the Minuteman II Weapon System from alert status and accelerated the elimination of these systems once the Strategic Arms Reduction Treaty is ratified.

As currently planned, the deactivation would begin in October of 1992, pending the ratification of the Strategic Arms Reduction Treaty, the outcome of the Environmental Impact Analysis Process and the publication of the record of decision.

Alternatives to the proposed action at Whiteman Air Force Base include, continued operation or no action taken, partial deactivation and missile removal and systems shutdown.

Possible implementation alternatives include, delay the deactivation for one year, the removal of the hardened intersite cable system, what we refer to as HICS, leaving deep-buried underground storage tanks in place, non-demolition of the launcher headquarters and mechanical

demolition of the launcher headworks.

The no action alternative would require a reversal of an established funding profiles for the Minuteman Weapon System. Partial deactivation and missile removal and systems shutdown and non-demolition of the launcher headworks, would deviate from plan implementation of the anticipated Strategic Arms Reduction Treaty.

Whiteman Air Force Base is the main operating and support base for 150 Minuteman II Missiles assigned to the 351st Missile Wing. The missiles are organized into the three operations squadrons as depicted on this slide.

The 508 Missile Squadron is north and east of Whiteman Air Force Base. The 509 Missile Squadron is southwest of Whiteman Air Force Base and the 510th Missile Squadron surrounds and includes Whiteman Air Force Base.

Each of these squadrons is comprised of 50 Minuteman III (sic) Missiles and five above-ground launch control facilities and that's located underground launch control

centers.

The retirement process itself will be a three-phased operation. The phases would be deactivation of the system, caretaker status -- or correction caretaker preparation and then dismantlement of the site.

The first phase would be deactivation. During this phase, the missile and associated ground components that can be re-used in other Minuteman Systems, would be removed from the site by Air Force maintenance teams presently assigned at Whiteman Air Force Base and depot maintenance personnel from Hill Air Force Base, Utah.

These teams will be accomplishing their ordinary maintenance task and would, therefore, not require any additional specialized or formal training.

I'd like to stress, too, that these teams are highly qualified and trained and performed these tasks every day.

Caretaker preparation is the next and second phase of the deactivation process.

During this phase, base civil engineering personnel would remove additional items that could be re-used and also remove any potential environmental contaminants from the site. These materials would include minimal amounts of PCBs, asbestos and sodium chromate solution.

Although, it is anticipated that the caretaker preparation phase of the process will be completed by Air Force teams, it may be, in some instances, proved to be more feasible or economical to utilize specialized skills, services and unique capabilities of civilian contractors.

We will evaluate the various tasks and make a determination of the best course of action not only for the Air Force, but also for the community.

After the site has been rendered environmentally safe, it will be placed in caretaker status until site dismantlement can begin. During this time Air Force personnel will conduct periodic drive-by inspections and check for excessive weed growth, as well as any potential vandalism

that might occur. The launch facility could remain in caretaker status for a period of weeks or months awaiting the start of site dismantlement process.

Site dismantlement, the third phase of the deactivation process, would involve the elimination of the above-ground structure at each launch facility, followed by a monitoring period and subsequent site restoration. It is currently planned that contractors would perform the site dismantlement tasks.

The cross-section view of a launch facility site is shown to the screen on my left. Each of these sites is slightly less than two acres of an area. Site dismantlement would result in the destruction of the area of a launch facility, we refer to as the Headworks, as identified on your slide.

To kind of given you an idea of what we're talking about, the concrete areas right in here, is just another view of it (indicating).

This destruction would involve the

elimination of the visible concrete structures at each launch facility to a predetermined depth. The debris from this destruction would then be pushed into the launch tube and the area would be surface graded.

The site would remain in this configuration for 90 days as specific in this Strategic Arms Reduction Treaty. The monitoring period would allow Treaty signatories the opportunities to confirm that the launcher cannot be re-used for its original designed purpose and that is launch our ICBMs.

At the end of the Treaty monitoring period, final site grading would be accomplished in the area on the site left marketable condition for future re-used or disposal.

Up to this point, I've described the process as it relates to the launch facilities. I would like to very briefly cover the process as it is envisioned for the launch control centers and launch control facilities.

Each launch control center and launch control equipment building at each launch control facility would be deactivated and rendered environmentally safe.

To kind of give you an idea if you're not familiar, this is what we refer to as a launch facility and then down underneath the grounds, we have the launch control center and the equipment portion (indicating).

Since elimination of above-ground structure is not required or planned, site dismantlement would be somewhat different. After the site is deactivated, we would close the doors to the launch control center and launch control equipment building and dump fill material down the elevator shaft to render the entrance inaccessible.

The elevator shaft located right here (indicating).

Finally, the shaft would be sealed by capping it with concrete.

The facility would then be disposed of as real estate after the completion of wing inactivation.

That completes the description of the

deactivation process that we would follow. I would now like to move on to a schedule and anticipated work flow that we foresee.

We have scheduled to begin the deactivation process in the 510th Missile Squadron. We plan to spend approximately 15 workdays deactivating each launch facility and launch control center and thereafter preparing it for caretaker status.

The slide to my left depicts ten workdays give or take a couple of days for the deactivation process itself and in three to five days for base civil engineering personnel to come in and do caretaker preparation tasks.

We have not finalized the contract requirements for dismantlement and therefore cannot comment on anticipated timelines.

We anticipate being able to start a new site each week. We feel that this schedule allows us to remain within our capabilities and, at the same time, conduct a safe project within anticipated work stoppages for inclement weather and time off for our maintenance teams, we would be able to

complete the project as scheduled.

We are presently scheduled to spend a year deactivating in the first quarter of fiscal year 1996. During the Scoping meeting of December 10th, 1991, Major McNamara, from the Directorate of ICBM Requirements mentioned that we were still determining the schedule beyond fiscal year 1993 .

I can now tell you that we plan to deactivate the three squadrons as this slide indicates. This schedule could be delayed if the Strategic Arms Reduction Treaty is not ratified.

What I've described to you will admittedly not be a simple task. However, I would like to remind you that with the exception of site dismantlement, none of the tasks are beyond the scope of normal maintenance activities for this unit.

Additionally, we are committed to doing this task safely and in full compliance are the environmental laws with the State of Missouri and the federal government.

The Air Force and Strategic Air Command

have for many years, considered area communities to be exceptionally good neighbors. We have *established a long term* commitment to this area and very much wish to remain a good neighbor to you.

Thank you.

COLONEL HEUPEL: Mr. Brian Goss of Labat-Anderson will now discuss how the previous public input was used to focus the analysis conducted for this Draft Environmental Statement.

Mr. Goss.

MR. GOSS: Thank you, Colonel. My name is Brian Goss, and I am the EIS Project Manager for the Labat-Anderson, the contractor in assisting the Air Force in the environmental impact assessment process

This environmental process began on *November* 14th *of* 1991, and the Air Force published a Notice of Intent in the Federal Register to prepare an EIS for the deactivation of the Minuteman II Missile System at Whiteman Air Force Base.

On December 10th, a Scoping meeting was

held in this facility to obtain input from agencies, organizations and the public on the scope of issues and to identify the significant issues related to the deactivation process.

Approximately 80 people attended the Scoping meeting, and five individuals presented verbal testimony. As part of the scoping process, written comments were also solicited.

The issues and concerns of the public along with programmatic requirements of the Air Force were analyzed and used to develop a range of alternatives and the factors by which these alternatives could be evaluated.

The issues and concerns of the public were also used to assess the impacts of the various alternatives, to identify significate issues, to develop mitigation measures to be incorporated into the alternatives and to select the preferred alternative.

Thank you.

COLONEL HEUPEL: And now Mr. George Gauger will provide you with an

explanation of the environmental impacts analyze process and the summary of the potential environmental impacts that this action may cause.

Mr. Gauger.

MR. GAUGER: Thank you, Colonel Heupel. My name is George Gauger and this evening I am representing the Environmental Directorate of Headquarter Strategic Air Command.

Tonight I will present a brief explanation of the environmental impacts analyze process, explain how this public hearing and your comments fit into the schedule and then provide a summary of the potential environmental impacts as presented in the Draft Environmental Impact Statement.

The draft EIS was prepared in accordance with the National Environmental Policy Act 1969, we also refer to it as NEPA. NEPA is our national declaration of policy for the environment that requires Federal Agents to consider the environmental consequences of major federal actions significantly affecting the quality of the

human environment.

Based on the regulations or implementation of the Act, the Air Force determined that an Environmental Impact Statement should be prepared to evaluated the environmental impact of the proposed deactivation and alternatives to the deactivation.

The Draft Environmental Impact Statement was filed with the Environmental Protection Agency on April 17th, and public comment period continues through June 1st of 1992.

As explained by Colonel Heupel, if you do not make a verbal statement tonight or have additional inputs after tonight's hearing, your comments may be sent to this address and they will be accepted until the end of the comment period.

I would like to introduce Captain Doug Hulings, who is in our audience tonight. He's our Representative from our headquarters Tactical Air Command, which on the 1st of June will become headquarter (inaudible).

Written comment sheets with this address printed on them are available at the registration table for your use.

All comments received tonight and through June 1st will then be reviewed and given equal consideration in evaluating and determining the implementing procedures and the mitigation measures the Air Force will take.

If necessary, additional analysis will be performed and the Environmental Impact Statement will be revised to reflect the comments received and the results of any new analysis.

A response will be made and printed in the final Environmental Impact Statement. I'll emphasize that all comments will be addressed in the final Environmental Impact Statement, so it's important to get those in to us.

To all of the comments -- We'll provide copies for all of the comments we receive.

The final EIS will be distributed to local libraries and those individuals,

agencies and organizations that were on our mailing list for the Draft EIS.

If you're not on that mailing list, you can add your name to that list tonight, if you so desire. If you are not on this mailing list and want to receive a copy of the final EIS, you can do so. We plan to complete the Environmental Impact Statement in August of this year.

The decision of the preferred alternative, implementing proceedings and mitigation measures for deactivating the Minuteman II Missile Wing at Whiteman Air Force will then be based on the input from the final EIS.

Again, the Environmental Impact Statement is a decision making document and that's why inputs are so important to us.

The Air Force record decision, which is the final decision made by Air Force managers, scheduled for completed in September will include measures that will be taken to avoid or minimize environmental harm from the selective action.

The Draft Environmental Impact

Statement focuses on the biological and physical environment and human environment in context of health, safety and cultural resources.

The document also discusses changes anticipated to the local socioeconomic environment. The following discussion highlights the predicted impact of the proposed Minuteman II deactivation only, and I underline only.

Cumulative impacts considering the proposed B-2, T-38 and A-10 basing action are also evaluated in the EIS and will be briefly presented after the projected Minuteman II deactivation impacts.

I might just add that there are two Environmental Impact Statements that are being done; one of them is for the B-2 and one of them is for the Minuteman II.

Before I go any further, I would like to define some terms that I used to describe the type and degree of environmental impact caused by activities associated with a proposed action or alternatives to that action. References to these terms will be

made during my discussion.

Impact to the environment were assessed for the proposed action, as well as other alternatives and were compared against existing conditions.

It was determined that the types of impact likely to occur to the resources from the proposed action or the other alternatives are similar; although, differing in magnitude. The key differences among the proposed action and the alternatives are in the scope of the action, the timing and the eventual disposition and re-used of the launch facilities and launch control facilities.

Under the no action alternative, the incremental impacts from existing operations, would continue.

The partial deactivational alternative could cause approximately the same types of impacts as the proposed action but to a lesser degree.

The areas where missile squadrons would be deactivated would incur the same impacts as under the proposed action and those areas

where squadrons continue operating, would incur the same impacts as under the no action alternative.

The missile removal and system shutdown alternative, non-demolition alternative and mechanical demolition implementation alternative would involve many of the same impacts as would occur under the proposed impact -- under the proposed action, but impacts attributable to explosive demolition would not occur.

Removal of the HICS rather than abandoning it in place, would likely cause significant impacts of soils, vegetation and water resources.

The environmental impacts of delaying the deactivation for one year would be the same as those likely to occur under the proposed action but would start one year later.

Environmental impacts of closures in-place of the deep-buried underground storage tanks differ negligibly from the impact of removing the tanks.

The following discussion focuses on the

potential environmental impacts of implementing the proposed action.

Site demolition, ground and air transport of the missile components and the use of construction equipment would have a short-term adverse, but yet insignificant impact to the local air quality. The air quality in the region would be negligibly impacted -- or I should say, negligibly improved following the deactivation of the system.

Soil disturbance, compaction and excavation of fill would cause locally adverse but insignificant impact of the soils in the deployment area. The environment would restabilize over the long-term.

Geological resources in the deployment area would be insignificantly affected by the explosive demolition of the launcher headworks and to excavating fill material. The deployment area is structurally stable, therefore, explosive demolition is unlikely to trigger ground slumping or seismic activity.

Ground movement associated with explosive demolition could significantly affect surface and ground water supplies and shallow wells in some local areas near launch facilities. No adverse impact are anticipated to deep wells and aquifers.

The proposed action and alternatives would not significantly affect the quality of the surface and ground water. Any potential of heavy metal leaching from the facilities, would not significantly alter the current -- alter the current levels of these metals found in the ground water.

With the minimal amounts of habitat likely to be disturbed limited periods of explosive demolition and the great distances between the launch facilities, implementing the proposed action would have only negligible impacts to the vegetative, aquatic and wildlife resources in the local area.

The Air Force has consulted with the U.S. Fish and Wildlife Service Department of Conservation regarding the presence of threatened, endangered or candidate species

in the deployment area. It is unlikely that federally and state protected species would occur from implementing the deactivation.

The Missouri Historic Preservation Officer has been consulted with regard to the presence of cultural resources in the deployment area and any potential impacts of implementing the proposed action or another alternative.

Ground disturbance during site demolition should have no significant impacts to any archaeological or paleontological resources. However, there is a slight possibility that previously undetected resources could be located and disturbed during excavations for fill material.

The Minuteman Missile System is eligible for nomination to be listed on the National Register of Historic Places. The demolition of this system without adequate documentation or preservation of a launch facility or control facility could be viewed as a significant loss of the historic structure. However, to mitigate this

impact, the Air Force proposes to retain the on-base launch facility trainer and launch control facility as operating museums.

Except for the no action alternative, each alternative including the proposed action involves removal of toxic and hazardous materials from the deployment area. Obvious benefits to the public and environment would occur upon removal and disposal of these materials.

Workers handling hazardous materials and waste will comply with applicable guidelines and regulations to make sure that the potential for exposure to hazardous substances is negligible. There would be insignificant short-term increases solid and hazardous waste generation during the deactivation process.

There would be short-term increases in noise levels from traffic at the Base, throughout the deployment area and along the transportation network between the two areas.

Noise and explosive demolition could annoy humans and wildlife; however because

of the distance between launch facilities, which is approximately four miles or greater. No, significant impacts to persons, wildlife or structures is anticipation.

After deactivation is complete, a negligible reduction of noise levels in these areas would be expected.

Although there would be an increase in deactivation-related vehicle of traffic through the deployment area, the amount of daily Air Force operations, maintenance and security-related traffic would decrease.

This would have an overall negligible effect on the transportation network and help prevent a significant impact of traffic flow and accident rates.

Over the long-term, a decrease in road maintenance funding and gradual deterioration conditions would be partially offset by a decrease in traffic, particularly the heavy Air Force vehicles.

Impacts to certain aspects of the socioeconomic environment in particular areas could be significantly adverse as

described to the screen to my left.

I will briefly describe the socioeconomic impact of implementing the proposed action. After presenting these impacts, I will summarize the accumulative socioeconomic impacts, which also consider the proposed B-2, T-38 and A-10 basing action at Whiteman Air Force Base.

The proposed action would involve a force reduction of approximately 1,650 full-time military personnel, but only 14 civilians. Over one half of this personnel reduction would occur in the final year of the deactivation.

In fiscal year 1995, this would represent the reduction of approximately 45 percent in base personnel compared to 1992 Whiteman Air Force Base employment levels proposed. The proposed action would result in a total population declined of approximately 6.7 percent in Johnson County, a significantly adverse impact in less than 1.3 percent of Pettis and Henry Counties by final year deactivation.

Based on the current multiplier for the

50-miles region of influence, approximately 900 military jobs could be lost during the deactivation. Over 90 percent of these jobs would be in Johnson County. This represents approximately one half of 1 percent of the totaled county employment.

Housing vacancy rates in Johnson County could experience a significantly adverse increase. The small communities of Knob Noster and La Monte where Air Force personnel constitutes a large portion of the total community population, would experience an even more significant adverse impact from high vacancy rates and declines in the local property.

When the deactivation is completed for a particular missile squadron, the launch facility and launch control facility lands will be disposed of by several possible methods, the first of which would involve the offering of the lands to adjacent landowners at fair market value. Disposal for excess real property would be through the Air Force or other federal agencies.

Knob Noster and Warrensburg school

districts, both in Johnson County, are expected to incur significant school enrollment impacts, with losses of 22 percent and 17 percent of enrollment, respectively. Federal impact aid losses are expected to be insignificant.

Land use and utility impacts are related to the launch facility and launch control facility deactivation process. Adverse, but insignificant, short-term impacts for land use would occur in the immediate vicinity in the launch control facilities and the launch facilities. However, long-term land use impacts would be insignificant.

Removal of the line-of-sight and Azimuth markers, to be done at the landowners request, would cause very localized and short-term adverse impacts in the vicinity of the marker. Insignificant utility impacts to suppliers of electricity to the launch facilities are expected to occur.

The proposed basing of the B-2, T-38 and A-10 aircraft is projected to occur

during and subsequent to the proposed Minuteman II deactivation action. This action is being separately addressed in the Minuteman II action.

Both studies are evaluating potential cumulative impacts, and a public hearing is being scheduled for late June on the B-2 Environmental Impact Statement so there's another event going to happen in another month.

Insignificant impacts projected under the proposed Minuteman II activation -- Minuteman II action could possibly be cumulatively significant when considered with a basing action.

The potential impact to the biophysical environment from the basing action would primarily occur within our -- within or in close proximity to the base boundaries, while the impacts from the deactivation would primary occur throughout the deployment area.

As illustrated by this slide, the cumulative socioeconomic impacts would be greatly reduced when compared to those in

the Minuteman II action without the basing action.

Based on recent personnel projections, the cumulative reduction in personnel authorizations would be less than 10 percent by fiscal year 1992 as compared to a 45 reduction in base personnel as a result of the Minuteman II deactivation without the proposed aircraft basing.

As you can see when you get out to these out years, that loss is very small (indicating).

Final judgment regarding the cumulative significance of impacts is deferred to ongoing study on the basing action, which is the B-2, that's being done right now.

As I stated earlier, that record decision will include those measures the Air Force will take to minimize the impacts identified to the biological, physical and human environment. Our goal is to provide the decision makers on accurate information on the environmental consequences on the proposed deactivation and alternative. To do this, we are here tonight to request your

input.

I would like to turn the meeting back over to Colonel Heupel.

COLONEL HEUPEL: At this point, we'll go ahead and take a ten minute break, let everybody have a smoke break and that will also give us an opportunity to collect all of the cards, and so if you have not filled out your card or if you decided you would like to speak and haven't gotten one, just pick a card up at the registration table and fill that out and they'll get them to me and when we start in, we'll start in with any elected officials, if we have any here and then after that we'll start in with the public.

So we'll start back up in ten minutes.

(Off the Record at 7:45 p.m.)

(Back on the Record at 8:00 p.m.)

COLONEL HEUPEL: Okay. We're ready to go ahead with the public comments portion.

Now, my understanding is we have no one

that is appearing in their elected -- in their elected status requesting to speak. We do have three speakers and I also have a written question I've been given and I'll ask that one and see whether that can be answered.

As we go along, some of the rest of you may even decide that you either have a question or you have a comment that you would like to make, and you certainly have that opportunity and we will keep the cards in the back.

If you decide you want to make a comment, just hold up your hand and we'll get a card to you. Once it's been filled out, hold it up again and they'll get it up to me so I can put it in with the stack.

I'd encourage you not to be shy or hesitant about making a statement. I think this is an important part of the process in being able to get oral statements as well as written statements.

With regard to making statements, I'll recognize the speakers and just ask you to come up and once I've recognized you to the

microphone, I'm playing with the volume of this, you kind of stand back a little bit, but if you could just go ahead and state your name and your address and that will get you started and give you a little bit of an idea how loud the microphone is.

Also, if you could, indicate if you're appearing as just an individual private citizen or if you're appearing on behalf of some organization.

We'll recognize you for five minutes, I'll be doing that timing on a loose basis. Since we have only three people at this point, I don't have to be too concerned about being out of here by 11 o'clock or so, but I'll go ahead and do the timing and I'll raise my hand up when the five minutes approximately is done, maybe a little bit over that. If you still have some more things to say, as long as it doesn't get too far down the road, we'll let you go ahead and say them.

If you have brought a prepared statement, whether you wish to speak or not, if you would just go ahead before the

proceedings is over tonight and put the prepared statement up on top of the table in front of the microphone, we can collect that.

If you have brought a prepared statement in addition to your written comments, again if you would put them there, we would certainly be most happy to get your statements.

Now as I've said before, the purpose of this meeting is to solicit input from public agencies, private organizations and the public at large on the Draft Environmental Impact Statement.

Now, the Air Force representatives that you see gathered here before you, are not the decision makers on this proposed action.

The record that is compiled from this hearing will ultimately be forwarded to those individuals that serve as the decision makers, but the people that we have here have provided you the information on the process.

If you have any questions, we'll see if they can answer them or not, but they're not

in a position to get into either a debate or to get into the pros or cons of a particular proposed action.

Okay. We'll begin our comments, and I've got three people so let's see who has the opportunity to be first. It's going to be Mr. J. Jeff Hancock of Warrensburg. Mr. Hancock, if you would, just make your statement to me, please.

MR. HANCOCK: My name is Jeff Hancock. I'm City Manager for the City of Warrensburg and previously in the Scoping meeting, I had made comments about the housing impact and all my comments are a socioeconomic comments that I'm going to make. On housing, the impact of business and the impact of -- on the education, revenues on education.

In particular, I made a comment about the coordination between the Minuteman, deactivation of the minuteman and B-2 and the other items coming on base.

1a-1

I got one question answered. I understand that in the Environmental Statement that's going to be prepared on the

B-2, that it will be coordinated Environmental Statement; is that correct?

COLONEL HEUPEL: Let me make sure, a portion of it will be coordinated; is that correct?

MR. GOSS: Accumulatively, we will be looking at the impacts in more detail than what is currently being assessed in the B-2 Bomber.

MR. HANCOCK: Okay. Because you have made some comments on both, and I have some questions and one statement.

On the -- In the back on 5.2 -- .2.1 for Number 4 on the proposed action of basing of the B-2 numbered aircraft, it indicates that there could result in a net decrease of approximately 350 personnel employment at the base.

Farther down it talks about, however, the small net decrease in jobs anticipated at Whiteman Air Force Base, is expected to provide only an insignificant adverse impact on the local economy.

1a-2

Farther down also, it talks about the housing market and it indicates that it is

anticipated that these extremes would neither create a tight housing market nor cause a significant increase in housing rates, respectfully.

There are approximately 15,400 housing units in Johnson County alone that would accommodate this level of fluctuation of housing supply in demand without serious impacts on the overall housing market.

In addition, there's a comment about there should be short-term adverse -- no, concerning Warrensburg, it's says, "Could experience a similar enrollment loss less than 4 percent of it's total enrollment.

Having said that, my question is, under partial deactivation with basing of the B-2 or other aircraft, it says, "When considered with the basing of the B-2 mission at Whiteman Air Force -- at Whiteman Air Force Base, this scenario cause less fluctuation in base employment than projected in other schools and the result is smoother transition from the school to the housing market".

I wonder if there's not a conflict that

would suggest that that be looked at further because there seems to be some conflict?

Secondly, in conclusion, I would just say that I would support partial deactivation with basing of the B-2 and other aircraft. 1a-3

COLONEL HEUPEL: Just to make sure that there's no question, the conflict that you're addressing when you were saying partial deactivation, can you point out what -- and I may have missed it because I don't have it, but what the conflict is so that it's something that can be addressed.

MR. HANCOCK: Apparent conflict is questioned. On one hand, all of the previous indications on the proposed actions basing on B-2 and other aircraft, it indicates that there won't be any problems.

Then on the partial deactivation, it talks about -- it suggests that there may be a problem and that by having partial deactivation with the basing of B-2 and other aircraft that quote, "it will result in smoother transition in schools and the housing market". 1a-4

I would say first of all that, therefore, because it may be a question I would support, personally support the partial deactivation of basing the B-2 and other aircraft, and I would respectfully request that your numbers be looked at in the final Environmental Impact Statement because there seems to be some questions, in particular, could result in a net decrease of approximately 350 personnel, and that's the first time that I've seen that figure.

COLONEL HEUPEL: Okay. Thank you very much. We only have two left, Mr. Larry Picken from Knob Noster.

MR. FICKEN: Thank you, Colonel. My name is Larry Ficken. I'm Assistant Superintendent of schools here with the Knob Noster School District.

We at Knob Noster School District, we are committed to providing excellent education and excellent educational opportunities and experiences for all of our students.

Our school district has a current enrollment of approximately 1,900 students,

and we do receive Federal Impact Aid to help pay the educational costs of military dependent school-aged children.

The Impact Aid Program is designed to make payments to the local school districts to offset revenues not receivable because federal property is tax exempt.

Impact Aid makes payment levels that decrease, and shown very little increase in the last five years.

Currently, payments are approximately $1,450 for a Category A student and a $130 for a Category B student. It's costing about $3,500 per year to educate all students -- or a student in our school district.

48 percent of the total enrollment in our school district are Category A students, and these are students whose parents live and work on Whiteman Air Force Base.

23 percent of the students that we educate are Category B. Category B students are students whose parents work on federal property, but live off base.

71 percent of our district's total

enrollment is directly tied to the missions at Whiteman Air Force Base.

During the past few years, the Knob Noster School District has been gearing up for the deployment of the Stealth Bomber. The school district is presently in the building project at the Whiteman Elementary School.

This building project was to eliminate overcrowding when the B-2 arrived. This building project will only take care of our needs for elementary school children.

Our concern at this point is that, will the personnel for the B-2 arrive in our school district before the total deactivation of the Minuteman mission is completed? If that happens, there may be a larger number of students in our school district than anyone anticipated.

1b-1

Because State and Federal revenues are tied to student numbers, the Knob Noster School District would certainly be affected by extreme fluctuations of student population.

There could be the situation, I guess,

that the Minuteman II deactivation had taken place quicker than the time tables has described, and the B-2 deployment was delayed and maybe we had already budgeted and hired teachers and staff for a certain number of students that we anticipated and those students don't show up and we don't get paid for students.

Then we get into a process of ripping staff and so forth that are very uncomfortable and not pleasing, and we certainly would like for all persons involved in this process to consider these factors as a part of the Environmental Impact Statement.

The military role and mission of the Federal Government places students in highly impacted schools such as ours and we in our school district welcome the opportunity and we welcome the challenge of providing a quality educational program for all federally connected students.

So we do ask that these time tables and these missions being deactivated and others being brought in, that the fluctuations of

student population be a consideration because those fluctuations greatly affect revenues and, of course, revenues affect the quality of education that we can provide.

I thank you for the opportunity.

COLONEL HEUPEL: Thank you for your comments.

At this time, Mr. Joe Anson from Higginsville.

MR. ANSON: Thank you very much. My name is Joe Anson from Higginsville, Missouri. I am former Mayor and Chamber of Commerce President, presently a John Deere dealer.

I'm here for one major reason, not to ask any questions and it's basically a concern thing, and that's the standpoint of the missile sites themselves.

Day by day, we have customers come in through our dealership and are just making comments generally about what is going to happen to those sites. You've answered a lot of those questions for me tonight in just observing the slides and the presentation.

1c-1

Agriculture is a big concern and, of course, Congress continual passages of laws with EPA Regulations, which we in the small business, have to observe day by day and a lot of these farmers are concerned about what is going to happen there and if any EPA concerns or hazardous waste concerns.

I thank you for your time. I'm not going on any longer. I didn't write anything down. Thank you very much.

COLONEL HEUPEL: Thank you, sir.

I have a question and I'll go ahead and ask and see if someone from the panel might be able to answer that.

It's from Mrs. Martha Price. Her questions are along the lines of what will happen to the missile cables that stretch across the farm sites going to the, I guess, launch control facilities?

Now, I believe that's probably referring to what I've heard describe as the HICS, if that's the right abbreviation.

The question is whether those will be taken up or whether they will remain in the

1d-1

ground and if they remain in the ground, would they pose any type of environmental hazard or cause any problem doing something such as putting a pond or lake in around them?

MR. GOSS: With respect to the proposed action, the plan is to leave the HICS in the ground. We had talked with some various power companies in the State of Missouri, and it's very common practice to leave these power cables underground.

The environmental damage of removing those would far out weigh the benefits.

For example, they could be a good source of recoverable copper, but from the potential environmental impacts from removal, we're looking at over a thousand miles of cable for this particular system.

COLONEL HEUPEL: That's all the comment cards and questions.

Now, let me go ahead and ask those at this point, since it's still early, I want to make sure everybody has had an opportunity to make any comments.

Is there anybody else that has any

comments they wish to make?

Sir, if you would go ahead and just come on up to the microphone and if you would state your name and your address, please.

MR. JOHNSON: I'm John M. Johnson from Warrensburg, Missouri.

Sir, until last July, I worked with the Air Force in the capacity as a real estate officer. I have been through the building of the Minuteman, I've been to every site we've got, I know most of the landowners adjacent to these sites. I've talked briefly with Major McRae on my concern.

Farmer Brown out here needs to be informed when you're going to do something, what you're going to do and when. 1e-1

In Missouri we're row croppers. We have cattle. I'll give you an example, this has happened a couple of times and we're buried out with the, (inaudible) we went out to sites we've had to blast and Farmer Brown's prized cows were there, here he comes in to complain, he said, hey, they won't give milk anymore, they're no good to

me. So we buy the farm.

When we were blasting at Delta Flight, we moved the man's house off of the foundation. We moved barns and such as this in the construction of the complex.

These folks, I think, need to be advised of what's going on, when they can expect it so Mr. Brown can take his cows out of the pasture or he can make other arrangements with his row crops.

I believe that doing so, we will save the tax payer a lot of money and expense that's unnecessary.

I was in Eldorado Springs the other day at my new job when I was cornered by four of the property owners down there that I know personally. One of them sitting there and I said, well, I guess, you know we're going to take those sites out and he said, No, I don't know anything about it.

A lot of the farmers, even around these sites do not know, have no knowledge or somebody said, hey, we held these meetings.

I don't know how many of you know much about the Missouri farmer, but some of these

farmers don't listen to the radio or read the newspaper or look at television, but they can tell you all of the latest on the stocks and so forth.

So we need, in my estimation, a way to contact these folks, okay, we're going down to Delta to deactivate, then we need to contact a man that owns that property around there and tell him, say, hey, Mr. Kanip, we're going to do certain things and see what he's done in the outlining areas that might be affected on them. 1e-2

Thank you, sir.

COLONEL HEUPEL: Thank you very much for your comments. We'll see if we can get those addressed.

Does anybody else have any other comments?

All right. As was indicated earlier, this is the first actual of two public hearings. There will be a public hearing probably, as indicated, in late June that will concern the B-2 and the T-38, A-10 proposed down here, so please keep reading your newspapers or listening to the radio so

that you can see when the hearing is going to be.

Also, as we said before, on the comment sheets, there is a place at the bottom, particularly, if you would like to get a copy of the final EIS that's done on this, you can check that so one will be mailed to you.

We thank you very much for all of your input, your involvement and your interest in coming out here tonight.

This meeting is adjourned.

(Proceedings concluded at 8:22 p.m.)

C E R T I F I C A T E

STATE OF MISSOURI)
) ss
COUNTY OF PETTIS)

I, the undersigned Certified Shorthand Reporter and Notary Public of the State of Missouri, do hereby certify that prior to being examined, the witness in the foregoing proceedings was duly sworn to testify the truth, the whole truth and nothing but the truth; that said proceedings were taken before me and thereafter transcribed into typewriting under my direction and supervision; and I hereby certify that the foregoing transcript of proceedings is a full, true, and correct transcript of my shorthand notes.

I further certify I am neither counsel, nor related to any party to said action, nor otherwise interested in the outcome thereof.

IN WITNESS WHEREOF, I have hereto set my hand and affixed my seal this 23rd day of May, 1992.

Karla L. Cary

KARLA L. CARY, CSR

KARLA L. CARY
Notary Public - State of Missouri
Commissioned in Pettis County
My Commission Expires February 21, 1993

2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

May 29, 1992

Master Sergeant Joseph Doyle
HQ TAC/CEVE
Langly AFB, Virginia 23665-5542

Dear Sergeant Doyle:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, we have reviewed the Draft Environmental Impact Statement (DEIS) for the Deactivation of the Minuteman II Missile Wing at Whiteman Air Force Base, Missouri.

We believe that the draft EIS adequately sets forth the environmental impacts of the preferred alternative (to follow the Strategic Arms Reduction Treaty guidelines for deactivation and dismantling of the Whiteman Air Force Base Minuteman II missile system) and those of reasonable alternatives. Our review has not identified any potential environmental impacts requiring substantive changes to the proposal. We believe that the areas of special concern, including compliance with all regulations regarding removal of regulated wastes, potential contamination of ground water, and minimizing socioeconomic impacts, are adequately addressed in the document. The EPA therefore gives a rating of LO-1 (lack of objections to the proposal with adequate information supplied in the document) to the draft EIS.

While we rate the draft EIS LO, we recommend that the final EIS contain specific detailed language regarding the storage, removal, transport, and ultimate disposition of any toxic/hazardous materials. Past experience has shown that it is difficult to determine what is left inside a missile silo once the top is blown in. If questions arise about what is inside, then costly methods, such as monitoring wells or excavation are needed to answer the questions unless detailed records are kept and made available. Furthermore, independent verification of these records make them more credible. 2-1

We look forward to reviewing the final EIS. If you have any questions, please contact Craig Bernstein at (913) 551-7688.

Sincerely,

Walter E. Foster

Walter E. Foster
Acting Chief, Environmental Review
and Coordination Section

3

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE DIRECTOR
P.O. Box 176 Jefferson City, MO 65102 314-751-4422

June 1, 1992

MSgt. Joseph Doyle
HQ TAC/CEVE
Langley AFB, Virginia 23665-5542

Dear MSgt. Doyle:

Staff within the Missouri Department of Natural Resources have reviewed the Draft Environmental Impact Statement for the proposed deactivation of the Minuteman II missile system consisting of 150 launch facilities and 15 launch control facilities located within an area of approximately 5,300 square miles surrounding Whiteman Air Force Base, Missouri. The attached comments are offered to aid in your preparation of a Final Environmental Impact Statement for this project. 3-1

We hope that you will give serious consideration to our comments and recommendations and that our comments will be helpful to the Air Force in this endeavor. We would appreciate receiving a copy of the Final Environmental Impact Statement when it is published.

Should you have any questions regarding our comments, please contact Mr. Thomas Lange of my office at 314-751-3195.

Very truly yours,

DEPARTMENT OF NATURAL RESOURCES

Ron Kucera

fn G. Tracy Mehan, III
Director

GTM:tlj

Attachment

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Comments on Draft Environmental Impact Statement
Minuteman II Missile Deactivation
Whiteman Air Force Base, Missouri

June 1, 1992

Asbestos

Any asbestos-containing materials must be handled in compliance with the Missouri Clean Air Law and Regulations. If the asbestos is friable or becomes friable because of removal methods, they must submit a notification for approval to the Missouri Air Pollution Control Program and Region VII EPA 20 days prior to commencement of removal activities and use a state registered asbestos removal contractor. 3-2

Historic, Cultural, Archaeological Resources

The Missouri Department of Natural Resources Historic Preservation Program concurs with the finding that deactivation of the launch control facilities will not adversely affect any structure or site listed on the National Register of Historic Places. Since demolition specifications are designed to prevent damage to nearby structures, this project will have no effect on structures that may be eligible for listing (but are not already listed) on the National Register of Historic Places. The Air Force's plan to preserve and maintain a launch control facility and a launch facility trainer as a working museum should serve as sufficient mitigation against the loss of the minuteman II system as a class of historic sites. 3-3

Launch Facilities, Section 2.2.3

We believe that the description of the destruction of the launch facilities could use more detail with respect to what will be allowed to fill the launch tube as "rubble" and how the filling will take place. It is not clear whether "rubble" will consist entirely of relatively inert construction debris (concrete, iron rebar, soil) or whether organic debris (wood, trash) will be included. Also, it is not clear if such debris will simply be allowed to fall into the launch tube during blasting or whether it will be crushed to assure a compact fill. 3-4 We recommend that the type of solid waste that can be placed in the abandoned launch tubes be limited to only demolition waste and clean fill. 3-5

If additional fill material is necessary for the silos, the option of acquiring fill material on site by creating a new borrow pit is left open. Such an option would only create new disturbances that may not be properly reclaimed, would add to erosion problems and waste topsoil. Considering the number of permitted quarries and sand and gravel operators in the area, we recommend that all necessary fill material be obtained from a properly permitted site. 3-6

We would also recommend that measures be taken, where appropriate, to minimize the amount of runoff allowed to enter the destroyed launch facility during the 90-day verification period. Many of the launch facilities are located adjacent to agricultural land where herbicides, pesticides and fertilizers are applied. The introduction of such surface contaminants into a deep excavation, such as the launch tube, should be avoided. A low berm or drainage ditch temporarily installed on the uphill sides of destroyed facilities left open for observation would probably serve the purpose adequately. 3-7

Solid and Hazardous Wastes

For waste that is being left in place and covered, solid waste disposal area deed notices may be required pursuant to the Missouri Solid Waste Management Law and regulations. 3-8

Materials covered with lead based paint may remain on-site and managed as demolition debris. Waste from electroplating must be managed as hazardous waste if it is determined to be such. 3-9

Lead-acid batteries and refrigerants (especially freons) should be recycled rather than managed as wastes. 3-10

Materials should be classified as waste or reusable material prior to their removal from the sites. We encourage the Air Force to reuse all that is practically possible. For materials for which that is not possible, we recommend that these materials be handled promptly and appropriately as wastes. We are concerned that some materials may be removed to another site and be subsequently released to the environment (see 2-21, "materials would be transported back to base for reuse or other disposition.", referring to PCBs, mercury switches and other potential contaminants). 3-11

On-site soils should be sampled to determine whether residual herbicides are present in concentrations that required cleanup or other response action. 3-12

Prometon or any other herbicide should be administered according to the manufacturer's labeled instructions. 3-13

Launch Control Facilities, Section 2.2.4

This section indicates that the support buildings and certain amenities (heating, air conditioning, and water supply) will be left intact for future use. It also indicates that sewage pipes will be plugged, and the sewage lagoon destroyed. It seems illogical to destroy this amenity when it, too, is likely to be needed for future use. If the lagoon and sewage system meet state and local health standards and functions properly, we would recommend that it be retained for future use. 3-14

Another alternative, should it be determined that buildings and amenities may not be needed for future use, would be to remove all surface structures and amenities from the properties before the land is turned back to surrounding land owners. The areas could then be revegetated in order to be compatible with surrounding land uses. This alternative course of action would ensure that the 165 parcels would not deteriorate over time and become future eyesores. 3-15 Finally, should the Air Force truly believe that the buildings and amenities will serve a future purpose, we recommend that the new owners be required to pay additional costs to acquire the improvements to help ensure an active interest in keeping and maintaining the improvements. 3-16

Geology, Section 3.3.2

The first paragraph of this section does not consistently, nor accurately, describe the generalized geologic setting of the deployment area. The surficial materials (Quaternary-age glacial deposits, alluvium, and residuum) are included in the descriptions of some of the physiographic provinces but not for others (Springfield and Salem Plateaus). 3-17

In addition, the description of the geology of the Osage Plains is misleading; it incorrectly implies that alluvium overlies bedrock everywhere. We recommend that this paragraph be rewritten by a geologist who is familiar with the general geology of Missouri. 3-18

Surficial Geology of the Deployment Area, Figure 3.3.2-1

The symbols of the key and the map in this illustration have been reproduced from the original at different scales resulting in patterns that do not match. This should be corrected to avoid confusion and incorrect interpretation. 3-19

Groundwater, Section 3.4.1

The description of aquifers of the deployment area (page 3-20, paragraph 3) is not entirely correct. The second sentence calls the alluvium the "uppermost unit." While this is the youngest unit described, it is only the uppermost where it exists, which is only a small portion of the area. The sentence, as well as Figure 3.4.1.1-1 on the following page, incorrectly 3-20

implies that it exists everywhere throughout the area. Another sentence states, "The Pennsylvanian formations.....are absent in eastern Vernon County." While there are small areas in eastern Vernon County where Pennsylvanian formations have been eroded, to state that they are absent in eastern Vernon County is misleading. 3-21

Figure 3.4.1.1-1 misrepresents the surficial materials of the area, as mentioned above, and is not a very representative illustration of the major aquifer groups, their confining beds, or the general structural setting of the state. The section at facility F-1 suggests no Mississippian strata are present. Logs of borings at that facility, on file at this agency, indicate Mississippian strata are present. A line of section should be shown on an accompanying map. In addition, this cross-section does not agree with the surficial geology as represented in Figure 3.3.2-1. 3-22

The last sentence of the first paragraph of page 3-23 is also misleading and was probably the result of misinterpretation of the source. There is some minor leakage between the major aquifers (usually localized situations), but they are not hydraulically connected by subsurface solution weathering. 3-23

In several places in the document, reference is made to the potential affects of blasting. This agency agrees that the controlled blasting is not likely to activate any faulting. However, the potential affects of blasting on nearby underground pipelines is not addressed. Many of these pipelines are very old and many contain products that would be harmful to the environment if released. In addition, pipelines may exist that are not shown on the maps referenced on page 3-15. Therefore, we would recommend that a survey be conducted around each launch facility to identify the precise location of any buried pipelines, to notify pipeline companies whose pipelines are nearby, 3-24

and to monitor ground vibrations during blasting at those nearby pipelines. Monitoring ground vibrations should also be considered at nearby buildings. Alternatively, an adjusted demolition plan or mechanical demolition of headworks could be considered where pipelines are threatened by blast damage.

Another issue that was not specifically addressed is the potential impact on water lines located in the vicinity of the launch or launch control facilities. The possible impact on such lines, especially for those served by public water systems, should be considered. 3-25

Underground Storage Tanks

The Air Force prefers to close underground storage tanks (USTs) in place. This does not pose a problem provided the USTs are emptied, cleaned and filled with an inert solid. In addition, site assessments and soil sampling in the vicinity of each UST will be necessary. Furthermore, should any assessments reveal contamination, corrective action will be required. In light of these requirements, the Air Force may want to reconsider its plan to leave USTs in place. 3-26

Any contamination should be reported directly to the Missouri Department of Natural Resources' Environmental Services Program (ESP) - Leaking UST Unit per standard UST procedures. ESP has responsibility for determining site cleanup levels.

Blasting

The Department of Natural Resources' Land Reclamation Program currently regulates blasting via federal guidelines at coal mines. For comparison purposes, we have used these regulations in compiling the following comments.

1. The U.S. Army Corps of Engineer blasting specifications at 4-27 for maximum ground vibration are consistent with, or more stringent than, the Land Reclamation Program regulations at 10 CSR 40-3.210(5)2. If these specifications are met, ground vibrations associated with launch facility demolition should be no greater than those associated with coal mining.

2. The Air Force specifications for maximum air blast sound level at 4-69 should describe the measuring device, since different devices give different readings of similar blasts. Land Reclamation Program regulations at 10 CSR 40-3.210(5)(B)1 call for the following: 3-27

Lower Frequency Limit of Measuring System, Hz (±3dB)	Maximum Level, in dB
0.1 Hz or lower-flat response	134 peak
2.0 Hz or lower-flat response	133 peak
6.0 Hz or lower-flat response	129 peak
C-weighted, slow response	105 peak dBC

3. The chance of sound focusing was pointed out on 4-70. This chance could be reduced by specifying, at 4-69, that no blasts would take place during a temperature inversion or on days when the wind is low and the sky overcast.

4. The Scaled Distance Formula ($W=(D/Ds)^2$) described at 10 CSR 40-3.050(5)(D)3 was applied to the launch facility demolition with the following results:

   a. When D (distance to nearest structure) = 2800' (the safety zone)
      Ds (scaled-distance factor) = 55
      W (allowable weight of explosives) = $(2800/55)^2$ = 2591 lb.

      The proposed 500 lb. explosive weight per detonation is well within the limits calculated when no structures are within the safety zone.

   b. When D = 1,200' (the distance from LF A11 to Blackburn)
      Ds = 55' and
      W = $(1200/55)^2$ = 476

      This suggests that a maximum of 476 lb. of explosive per 8 millisecond delay period be used for the launch facility A11 demolition.

   c. When D = 400' (the distance from LF D-11 to the nearest structure)
      Ds = 55, then
      W = $(400/55)^2$ = 52 lb.

      This suggests that a maximum of 52 lb. of explosive per 8 millisecond delay period be used for the Launch Facility D-11 demolition.

<u>Other Minor Errors Noted in the DEIS</u>:

1. On page 3-30, second paragraph, the phrase "minimum contaminant level for TDS" should be "<u>maximum</u>" contaminant level for TDS".

2. On page 3-30, last paragraph, the reference for Linda Killion, DNR is misspelled. 3-28

3. On page 6-4, the reference for Linda Killion is misspelled, and the program listed is incorrect. The correct reference should be:

   Killion, Linda. 1992. Personal communication. Missouri Department of Natural Resources, Division of Environmental Quality, Public Drinking Water Program. January 29, 1992.

-5-

4

KNOB NOSTER PUBLIC SCHOOLS R-VIII

ADMINISTRATIVE OFFICE • 401 EAST WIMER • KNOB NOSTER, MISSOURI 65336

Mr. John Brummel, Superintendent (816) 563-3186
Mr. Larry Ficken, Asst. Supt. (816) 563-2251
Mr. Michael G. Larson, Dir. Spec. Prog. (816) 563-5597

May 19, 1992

TO WHOM IT MAY CONCERN:

ENVIRONMENTAL IMPACT STATEMENT FOR THE MISSILE DEACTIVATION AT WHITEMAN AFB, MO

The Knob Noster R-VIII School District is committed to excellence in providing educational opportunities and experiences for its students.

The Knob Noster School District has an enrollment of 1,671 students this year. Our district receives federal impact aid to help pay the educational costs of military dependent school-age children. The impact aid program is designed to make payments to the local school district to offset revenues not receivable because the federal property is tax-exempt. Impact aid payment levels have decreased or shown very little increase in the last five years. Currently, payments are approximately $1,450 for a Category "A" student and $130 for a Category "B" student. It is costing about $3500 per year to educate each student in our district. Forty-eight percent of the total enrollment are category "A" students. Category "A" students are students whose parents live and work on Whiteman Air Force Base. Twenty-three percent of the total enrollment are category "B" students. Category "B" students are students whose parents work on federal property but live off base. Seventy-one percent of the total district's enrollment is directly tied to Whiteman Air Force Base and it's missions.

During the past few years, the Knob Noster School District has been gearing up for the deployment of the stealth bomber. The school district is presently in a building project at Whiteman Elementary School. The building project was to eliminate over-crowding when the B-2 mission arrived. This building project will only take care of our needs for elementary school-age children. Will the personnel for the B-2 mission arrive before the departure of the personnel for the missile wing? If so, our school district will need to make some modifications to the schools in Knob Noster. 4-1 Because state and federal revenues are tied to student numbers, the Knob Noster School District certainly would be affected by extreme fluctuations of student population. Please consider these factors as a part of the Environmental Impact Statement. 4-2

The military role and mission of the federal government places students in highly-impacted school districts such as ours. The Knob Noster School District welcomes the opportunity and the challenge of providing a quality educational program for all federally-connected students. Please consider the impact to the school district in the Environmental Impact Statement. 4-3

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Response to the Draft Environmental Impact Statement
Deactivation of the Minuteman II Missile Wing
Whiteman AFB, Missouri

This response is written on behalf of the members of the Sedalia Area Chamber of Commerce specifically and the Sedalia community generally.

The deactivation of the Minuteman II Wing (351 hereafter) may adversely affect the Sedalia area in several ways now and in the future.

First, deactivation will cause the retailers and suppliers of goods and services to lose significant sales. Loss of sales will, without replacement from another major source, result in loss of jobs. Contrary to the statistics cited in the draft EIS, many major retailers in Sedalia claim large portions of their retail sales to come from WAFB. Sales to or because of WAFB are, in some instances, in excess of 25 percent of the business sales. This is not insignificant, as characterized in the draft. 5-1

In addition to the direct loss of retail sales, the indirect loss resulting from the loss of jobs and income in neighboring Johnson and Henry counties will compound the impact of the loss of buying power applied in Pettis County. Sedalia benefits greatly from major purchases made by those from Johnson County. Whether the purchases are made by Air Force personnel or others, the dramatic impact the deactivation will have on the Johnson County economy will account for a significant ripple in the Pettis County marketplace far in excess of impact foreseen in the draft. As supporting evidence of the impact of retail consumption in Pettis County by those from Johnson County, the Outshopper's Survey, 1990 was conducted on behalf of this organization by Central Missouri State University. 5-2

Impact on the Rural Electric Cooperatives are minimized in the draft. The impacts are minimal, the logic goes, because the balance of the customer base will absorb the loss through increases in rates. 351 facilities represent an industrial user to the coops, and the rates burdening the rural electrical customer, further reducing personal and business buying power, will only exacerbate the impact of the deactivation. 5-3

Environmental hazards of deactivation are minimized and handled in the draft under the cover of various thresholds of applicable environmental law. 5-4 The determination of materials to be left, the existence of materials already purposely or inadvertently concealed on the various remote sites remote from WAFB, and the clean up of such materials should be coordinated through such an entity as the Whiteman Area Steering Council. The Council should be granted funds for independent monitoring of Air Force site deactivation with particular emphasis on environmental issues, such as the location of hazardous and other solid wastes, and any activity that falls under the Installation Restoration Program. 5-5 Sampling conducted on the sites should be conducted jointly, and samples split for independent evaluation. 5-6

Appelling was the report's desire to minimize claims from agriculture accidents caused by cables heaving to the surface of cultivated fields. The vacation of easements, and the grant of full use of the land returned to private interests, should occur. However, the easements should only be vacated once the Federal Government has indemnified the users of the former easements against all damage caused by or contributed to by remaining Air Force property. 5-7

In total, the deactivation is a negative occurrence for the Sedalia area. Jobs will be lost, revenues will decline and the environment may be significantly affected as a result of the deactivation. 5-8 Since the deactivation must be seen as an overall public good, the Federal government must assume responsibility for helping the communities in the Whiteman area to mitigate the losses to gain the greater good. These are not burdens we should bear alone. 5-9

The observation is made that the Air Force is quite anxious to maximize the economic impact that those resident at, or because of WAFB, provide to our communities when currying favor with the general Whiteman area, but are now in essence saying, "Aw shucks, the missiles and support personnel don't count that much to ya'all". Please refer again to the annual WAFB Economic Resource Statements. 5-10

6

TO: Christine Sutherlin
Labat Anderson
FAX 402-291-2836

FROM: Sedalia Area Chamber of Commerce

DATE: June 15, 1992

RE: Clarification of Response to Preliminary EIS
Deactivation of Minuteman II - WAFB, Missouri

Clarification is necessary for a portion of the response submitted regarding the effect of the deactivation of the Minuteman II at Whiteman AFB on the Sedalia, Missouri marketplace.

It is our belief that several of Sedalia's retail and service establishments will be damaged by the removal of the Minuteman. This belief is founded in the comments of people in business and those who serve businesses in the Sedalia area. 6-1
Further, recent information obtained through studies conducted by the Whiteman Area Steering Council indicate that when shoppers from Johnson County come to Pettis County (Sedalia) 6-2
to shop, it is for major-ticket items. The combination of impact on certain individual businesses in the Sedalia community from the deactivation, and the forecast impact on Johnson County will be to the detriment of Sedalia retail sales. 6-3

Our original statement inferred that up to "25 percent of retail sales" in the Sedalia marketplace may be impacted as a result of the deactivation, and that number was also incorrectly tied to an outshopper study conducted in Sedalia. 6-4

Apologies are extended for the poorly drafted and easily misinterpreted earlier statement.

7

United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL AFFAIRS
230 S. DEARBORN, SUITE 3422
CHICAGO, ILLINOIS 60604

TAKE PRIDE IN AMERICA

ER-92/340

June 11, 1992

Captain Doug Hulings
HQ TAC/CEVE
Langley Air Force Base, Virginia 23665-5542

Dear Captain Hulings:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the Deactivation of the Minuteman II Missile Wing at Whiteman Air Force Base, Missouri. We offer the following comments on the subject document.

Geological Resources

As discussed in the subject document, coal, limestone, sand and gravel, clay, lead, zinc, and barite have been mined in and near the missile deployment area, although most mines have been abandoned. Oil and gas fields, wells, and pipelines also are present. Potential production of the above commodities probably would not change as a result of project implementation. Impacts to mineral resources, primarily construction materials, and mitigation measures are discussed in the document. The sections on the removal and cleanup of hazardous materials discuss possible contamination of ground water, but do not address the potential contamination of mineral deposits. A discussion of that possibility, along with impacts and mitigation measures, should be included in future versions of the document. 7-1

Water Resources

Water-quality background levels for ground water should be assessed from wells up-gradient from the launch tubes. The down-gradient wells may already be contaminated from the up-gradient launch tubes. 7-2 The lead transport model predictions in the document are based on a 5 percent annual leach rate over a 20-year period (Appendix B, pg. B-2). Model runs should be conducted to determine lead concentrations for a range of leach rates. Because the launch tubes are known to contain hazardous waste materials, the sites should be treated as any site where known hazardous materials are buried. Capping the launch tubes with cement may diminish the possibility of surface waters moving down into the abandoned tube, but it does nothing to affect the horizontal movement of ground water through the tubes. 7-3 If modeling with conservative assumptions predicts contaminant concentrations above regulatory levels, mitigation such as removal of the contaminants or sealing of the launch tubes should be considered to reduce the risk of movement of contaminated ground water out of the launch tubes. 7-4

We appreciate the opportunity to review and provide comments on this document and look forward to continued coordination.

Sincerely,

Sheila Minor Huff

Sheila Minor Huff
Regional Environmental Officer

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April 24 - 1992
Knob Noster, Mo

MSgt Joseph Doyle

I would like to have some information on the deactivation of the M.M.II missile system at Whiteman A.F.B. in Missouri

I'm a Farmer and I had to give the Government a 16½ ft. right away or easement across my land for the missile cable. When the missile system is deactivation will the easement or right away be given back to me. 8-1

Will the Government do the paper work on it. 8-2

Thank you

Erwin C. Beard
RFD"2 - Box 75
Knob Noster, Mo.
65336-9409

9

June 1, 1992
537 SE Y HWY
Warrensburg, Mo. 64093

MSgt. Joseph Doyle
HQ TAC/CEVE
Langley AFB, Virginia 23665-5542

MSgt. Joseph Doyle

We saw the item in the Daily paper about the deactivation of the Minute Man Missels. We are the landowers surrounding the Oscar-9 launch facility. We are wondering what will be done with the land when Oscar 9 is removed? 9-1

We would want to purchase the land if at all possible. 9-2 When will the Missel be deactivated 9-3 Do you know what will be the market value of the land and can we purchase the land ba k? 9-4

Looking forward to your reply.

Sincerely,

Virgil R. Coleman

Virgil R. Coleman Owner

Goldie Nadine Coleman

Goldie Nadine Coleman Owner

537 SE Y HWY

Warrensburg, Missouri 64093

Speakers at Public Hearing

Mr. J. Jeff Hancock, City Administrator of Warrensburg, MO

1a-1 Although the environmental analyses for the B-2 basing action and the MM II deactivation are being prepared separately, both documents assess the cumulative impacts of both actions occurring. The EIS for the basing action will evaluate the cumulative impacts in slightly more detail than the Minuteman II document, since the basing action document is scheduled to be completed after the MM II document.

1a-2 In response to your comment, the discussion of the partial deactivation alternative (section 5.2.2.4) has been revised.

1a-3 Comment noted.

1a-4 The Air Force has evaluated your comment and reassessed the numbers originally provided in the draft EIS. See response to comment 1a-2.

Mr. Larry Ficken, Assistant Superintendent of Schools, Knob Noster, MO

1b-1 In response to your comment, the Air Force has added a table to section 5.2.2.1 of the EIS. This table shows the latest available information on personnel changes scheduled for Whiteman AFB as part of the MM II deactivation, the B-2 basing action, and the DoD force reductions that are scheduled to occur at Whiteman AFB regardless of planned actions.

Mr. Joe Anson, Higginsville, MO

1c-1 Comment noted.

Mrs. Martha Price

1d-1 To further clarify the issue pertaining to the hardened intersite cable system (HICS), another power company was contacted and indicated that power lines are routinely buried at depths of 36 to 42 inches. If there was a degradation problem associated with leaving a power cable underground, the Missouri DNR would require cable removal; there are no regulations regarding the removal of de-energized power cables.

Constructing a pond or shallow lake above the HICS should not present any environmental hazards. However, if an excavation of greater than 3 feet is required to form a man-made reservoir, the cable would likely need to be cut and removed to preclude a physical hazard (a cable protruding from the ground) from occurring.

Mr. John M. Johnson, Warrensburg, MO

1e-1 Landowners will be notified before demolition or excavation work is begun in their area.

1e-2 See response 1e-1.

Commentors

United States Environmental Protection Agency, Region VII

2-1 The Air Force has identified and listed all the materials to be considered hazardous based on prior information and knowledge of the missile sites. For the initial phase of the deactivation program, the Air Force would remove and handle these hazardous materials and wastes utilizing the existing Air Force procedures established in accordance with all applicable Federal and state laws and regulations. The Air Force intends to remove the items from the missile sites and turn them over to the DRMO for disposition. All of these items will be documented based on their disposition and retained on file.

Any Air Force contractor that would perform operations during subsequent phases of the deactivation would be required to manifest any hazardous waste and record the disposition of hazardous materials taken from the site. The Air Force would ensure compliance through inspection of records and comparison to material lists prepared by the Air Force. Any hazardous waste would need be manifested to a facility licensed for the storage, treatment, or disposal of hazardous wastes.

The Air Force will prepare a deactivation plan for submission to the Missouri Department of Natural Resources. The plan will include further details regarding the deactivation such as contractor requirements for removing hazardous materials and wastes, the presence and disposition of particular hazardous materials and wastes, and test requirements and plans for taking soil samples at LF and LCF sites. Three random sites will be sampled as part of a reconnaissance program. The Air Force will meet with representatives from the Missouri Department of Natural Resources to determine potential further actions to ensure that there is no significant health or environmental risk attributable to the LF and LCF sites. See responses 3-2, 3-4, and 3-10 for further information regarding contractor requirements.

Missouri Department of Natural Resources

3-1 Thank you for your helpful comments. We have seriously considered your comments and have modified the EIS in numerous locations in response to your comments. Please see our detailed responses to your comments.

3-2 Comment acknowledged. The text in sections 1.4.2 and 4.7.2.2.1 has been modified to reflect that State certification is required for the supervisors and workers conducting the asbestos removal. Section 1.4.2 has also been modified to note that asbestos removal procedures outlined in Federal and State regulations would be adhered to during the removal of friable asbestos-containing materials and materials that become friable during the removal actions.

3-3 Comment noted.

3-4 Comment acknowledged. The text in section 2.2.3 has been modified to indicate that the type of solid waste that would be placed in the abandoned launch tube would be limited to only demolition waste and clean fill. The dismantlement contract would also specify those same requirements.

3-5 See response 3-4.

3-6 The Air Force intends on using fill from established borrow pits.

3-7 Your comment has been considered and the text has been changed accordingly (see section 4.3.2.3)

3-8 Comment acknowledged. The text in the executive summary and section 2.2.3 has been modified to note that for demolition wastes that are left in place and covered, solid waste disposal area deed notices may be required pursuant to the Missouri Solid Waste Management Law and regulations promulgated from the Law. The notice would be disclosed prior to the transfer of the government property.

3-9 A sample of the waste stream would be analyzed utilizing the toxicity characteristic leaching procedure guidance and procedures. Because electroplating was only performed on limited areas of each launch facility, it is not anticipated that cadmium levels would exceed the regulated standards. However, if the cadmium levels do exceed the specified standards, then the waste stream would be categorized as a hazardous waste and handled appropriately.

3-10 Comment noted. The Air Force intends to specify in the dismantlement contract that the contractor submit a plan to the Air Force for approval regarding the removal and disposal of particular items from the missile sites including the sodium chromate unit and residual solution, lead acid-batteries, and the asbestos waste. Proper disposition of these items from the missile sites would require adherence to all applicable Federal and State regulations along with specific Air Force regulations and guidance.

3-11 Comment noted. Hazardous materials removed by the Air Force would be brought back to the base for their disposition. These materials would then be accepted into the government system and forwarded to the Defense Reutilization and Marketing Office (DRMO). The DRMO would first determine if these materials could be reused or recycled, and if neither option is possible, dispose of the materials as hazardous waste at an approved disposal facility located off base.

3-12 The Air Force is preparing a sampling plan to sample soils from LF and LCF sites and determine concentrations of herbicides and other potential contaminants. The sampling plan would be submitted to the State prior to performing the sampling. Also see response 2-1.

3-13 The Air Force does not plan on using any herbicides at a facility after the deactivation process at that facility has begun.

3-14 Comment noted. To ensure that no environmental hazards remain on-site, and to minimize future liability, the Air Force has planned to close the sewage lagoons. However, the Air Force is currently reviewing its plans and may consider deactivating the LCFs without closing the sewage facilities.

3-15 For past deactivations, the Air Force has considered the desires of the surrounding landowners and determined that the deactivated sites were useful as fenced, gravel maneuver areas. The small area within the LCFs, less than 2 acres, comprises a small proportion of area farmland (less than one percent), and has a higher potential land value as a living facility. Consequently, the Air Force has not made plans to demolish the living facilities and return the land back to its prior land use.

3-16 The Air Force had not planned to require purchasers of former LCFs to pay an additional sum for upkeep; this option could reduce the marketability of these lands and the former landowners may need to forego the purchase of the lands and allow them to be purchased by other interests or become surplus government property.

3-17 The generalized description of the geology of the deployment area (see section 3.3.2) has been revised to homogenize the descriptions of the area.

3-18 The description of the geology of the Osage Plains (see section 3.3.2) has been modified to indicate that alluvium is generally found over the bedrock, but not in every location.

3-19 Review of figure 3.3.2-1, revealed that the scale needed to be corrected. However, to maintain a cost-efficient document, a decision was made to retain the image size of the map because the legend patterns are significantly different enough that the size would prevent the identification of the geologic type.

3-20 The third sentence of the third paragraph of section 3.4.1.1 states where the Quaternary-age alluvium aquifers are generally found. Figure 3.4.1.1-1 shows alluvium across the deployment area as a generalized illustration. The level of detail needed to show outcrop areas is beyond the scope of this document. Figure 3.4.1.1-1 has been revised to provide a more specific cross-section based on well logs. However, the alluvium is still illustrated in a general manner.

3-21 The statement that Pennsylvanian formations are absent in eastern Vernon County has been referenced in the text.

3-22 Figure 3.4.1.1-1 was meant to be a conceptual representation of the three main aquifers in the deployment area. This figure was based on the anticipated stratigraphy of the 1962 Porter & O'Brien study. A new and more accurate illustration has been produced using the log borings available from the MDNR. In addition to logs of LCF water wells, municipal and private well logs were used to produce the revised figure 3.4.1.1-1.

3-23 In response to your comment, the last sentence of the first paragraph on page 3-23 has been deleted.

3-24 Demolition contractors are required by State law to give advance notice to public utilities, gas companies, or other entities owning pipelines before beginning work, and to follow State damage prevention rules. Contractors performing demolition would be responsible for identifying pipelines, by means of a survey or other techniques. This commentary has been added to section 4.3.2.2 of the EIS to clarify this point. Because blasting charges would be unique to each site, further definition of charges and detonation delays are beyond the scope of this EIS and would be assessed in the contractor's demolition plan.

3-25 See response 3-24.

3-26 Section 2.2.4 has been modified to reflect the method for permanent closure of the deep buried USTs at the launch control facilities (LCFs). At this time, the Air Force intends on removing the 14,500-gallon UST from each LF, and the 2,500-gallon UST from each LCF. The deep-buried 14,500-gallon UST at each LCF would be permanently closed in place by filling the tank with an inert solid material. All of the permanent tank closures would be conducted in accordance with all applicable Federal and State regulations. If contamination was found during site assessment of the deep-buried tanks, the Air Force would follow the notification requirements as specified by the commentor and would ensure that the site was remediated to meet MDNR corrective action cleanup goals. A UST Closure Report would be submitted to MDNR.

3-27 See response 3-24. Also, the sound levels that could impact receptors close to the sites, as well as from sound focusing, are not projected to be significant (see section 4.8.2). Required demolition blasting practices would be performed and suggested mitigations, while not mandated, could be performed on a site-specific basis. This process allows for flexibility to accommodate special circumstances.

3-28 The text has been revised accordingly.

Knob Noster Public Schools

4-1 See response 1b-1.

4-2 The enrollment changes resulting from both the MM II deactivation and the basing action have been discussed in section 4.10.2.5. In response to your comment, an additional mitigation measure (the Air Force notifying the local school districts of any incoming personnel scheduling changes that may occur related to the MM II deactivation and the B-2 basing action) has been proposed (section 4.7).

4-3 The impacts to the school systems have been assessed in the draft and final EIS. The Air Force understands the difficulties to schools that result from fluctuating personnel actions, and appreciates the desire of the Knob Noster School District to maintain a quality education for all students, including federally-connected students, in an area where Air Force-connected students make up such a large proportion of the total enrollment.

Sedalia Area Chamber of Commerce Letter on the MM II Deactivation at Whiteman AFB

5-1 In the draft EIS, the assessment of retail impacts was based on the Whiteman Area Steering Council's 1991 "Shopping Survey of the Military Consumer at Whiteman AFB." The Survey revealed that Sedalia was generally the third choice for Whiteman personnel's off-base shopping, and that furniture was the main item purchased by Whiteman personnel shopping in Sedalia. Because of residence patterns and shopping preferences, it is unlikely that Pettis County or Sedalia merchants as a whole would incur a significant impact to retail sales, as stated in the EIS. However, there may be significant business-specific (e.g., furniture dealers) or localized (merchants in a particular part of Sedalia or Pettis County) impacts. The assessment of highly business-specific or localized impacts is beyond the scope of this analysis. See also comment 6-4.

5-2 See response 5-1 and comment 6-4.

5-3 Impacts on rural electric cooperatives were determined to be insignificant based on the percentage of revenue each cooperative currently derives from its Air Force customer. These percentages range from less than 1.0 percent to 2.6 percent. An attempt was made to contact an electric cooperative to collect further information for assessing the impact to the cooperative. However, officials of the cooperative declined to provide any information to assist our analysis of potential impacts.

5-4 The addressing of potential hazards associated with daily operations and planned deactivation activities has not been minimized. Environmental laws are designed to protect the environment and the health of the public. Whiteman AFB adheres to the laws and regulations that have been set forth at the State and Federal level.

5-5 According to The Daily Star-Journal of Warrensburg MO, dated Wednesday, May 13, 1992, the Whiteman Area Steering Council will curb its operations in July, 1992. Materials that would be considered hazardous as part of the proposed MM II system deactivation have been identified and would be handled in accordance to all applicable environmental laws and regulations. All soil and water sampling associated with the deactivation is being planned and would be performed in full compliance with State and EPA requirements. A deactivation plan, sampling plan, and sample results would be made available to the The Missouri Department of Natural Resources.

Revised Comments from Sedalia Area Chamber of Commerce

6-1 See comment response 5-1.

6-2 See comment response 5-1.

6-3 See comment response 5-1.

6-4 Thank you for this clarification.

United States Department of the Interior, Office of Environmental Affairs

7-1 Sections 3.7.2, 4.3, and 4.7 of the document have been revised in response to your comment. Because of the limited quantities of hazardous materials and wastes being handled or transported at a given time and location, the remoteness of mineral resources from the sites, and the requirements to remediate spills, no significant impacts caused by spills are projected to occur. No additional mitigation measures are required because the existing transportation and handling requirements, as well as the prescribed spill response activities, are sufficient to minimize the potential for mineral resource contamination.

7-2 Based on your comment, a detailed study of the background ground-water concentrations of lead in wells upgradient and downgradient from launch facilities was performed. The findings of the study are provided in section 3.4.1.2. Of the 46 wells surveyed that were within 5 miles of launch facilities, 10 were downgradient, 2 upgradient, and 34 were located side gradient to the launch sites. In the process of reviewing the ground-water data, it was determined that only two wells had lead levels at or greater than the MCL for lead (see section 3.4.1.2). These two wells were not located downgradient from the launch facilities and were one mile or more away from the sites, indicating that the source of the lead was not lead-based paint from the launch facilities. The mean and mode values for the lead samples did not vary significantly depending on the location of the wells. The median and mode were both 5.0 µg/L and the mean was 7.2 µg/L. Because many lead analyses were listed as "less than 10 parts per billion or less than 5 parts per billion," the mean is overstated and the results are not statistically accurate to allow a site-by-site comparison of lead levels.

7-3 In response to your comment, more modeling runs were performed to assess predicted lead concentrations for a range of leaching rates. Appendix B was revised to discuss the additional modeling results. The initial concentration of lead in water was essentially proportional to the leaching rate at the modeled concentrations. Changing the leach rate to 20, 50, or 100 percent per year would increase the initial dissolved lead concentrations by approximately 4, 10, and 20 times, respectively. Assuming 100 percent leaching per year would only result in a less than 2 part per billion concentration 0.25 miles downgradient from the launch

facility. Based on background lead concentrations (see response 7-2), the lead concentrations in downgradient wells would not likely be significantly affected (lead levels would not exceed the MCL).

7-4 Based on the extreme assessment of a 100-percent leaching rate per layer per year, contamination levels are not projected to exceed regulatory levels. Consequently, no specific mitigation measures are proposed to reduce the lead levels.

Mr. Edwin C. Beard, Knob Noster, MO

8-1 Restrictive easements would generally revert back to the former landowners after the deactivation process is completed for a particular missile squadron. The deactivation process would take approximately 1 year per squadron.

8-2 The United States government would prepare the necessary paperwork and submit it to the acquiring party. It is the responsibility of the acquiring party to file the paperwork at their respective courthouse.

Mr. Virgil R. Coleman and Ms. Goldie Nadine Coleman, Warrensburg, MO

9-1 As described in section 2.2.3, the Air Force or the Corps of Engineers could convey government interest at fair market value to an owner or owners of the property surrounding a deactivated site.

9-2 The Air Force proposes to deactivate the MM II Intercontinental Ballistic Missile (ICBM) system in Johnson County, Missouri (which includes Oscar-9), sometime during a period of approximately 3 years beginning in October 1992. The October 1992 start date could be delayed nearly 1 year because it is dependent on the ratification of the Strategic Arms Reduction Treaty.

9-3 The land will be offered for sale at fair market value. Appraisal data are not currently available. Appraisals will be made on a site-by-site basis during the deactivation process.

9-4 See comment response 9-1.